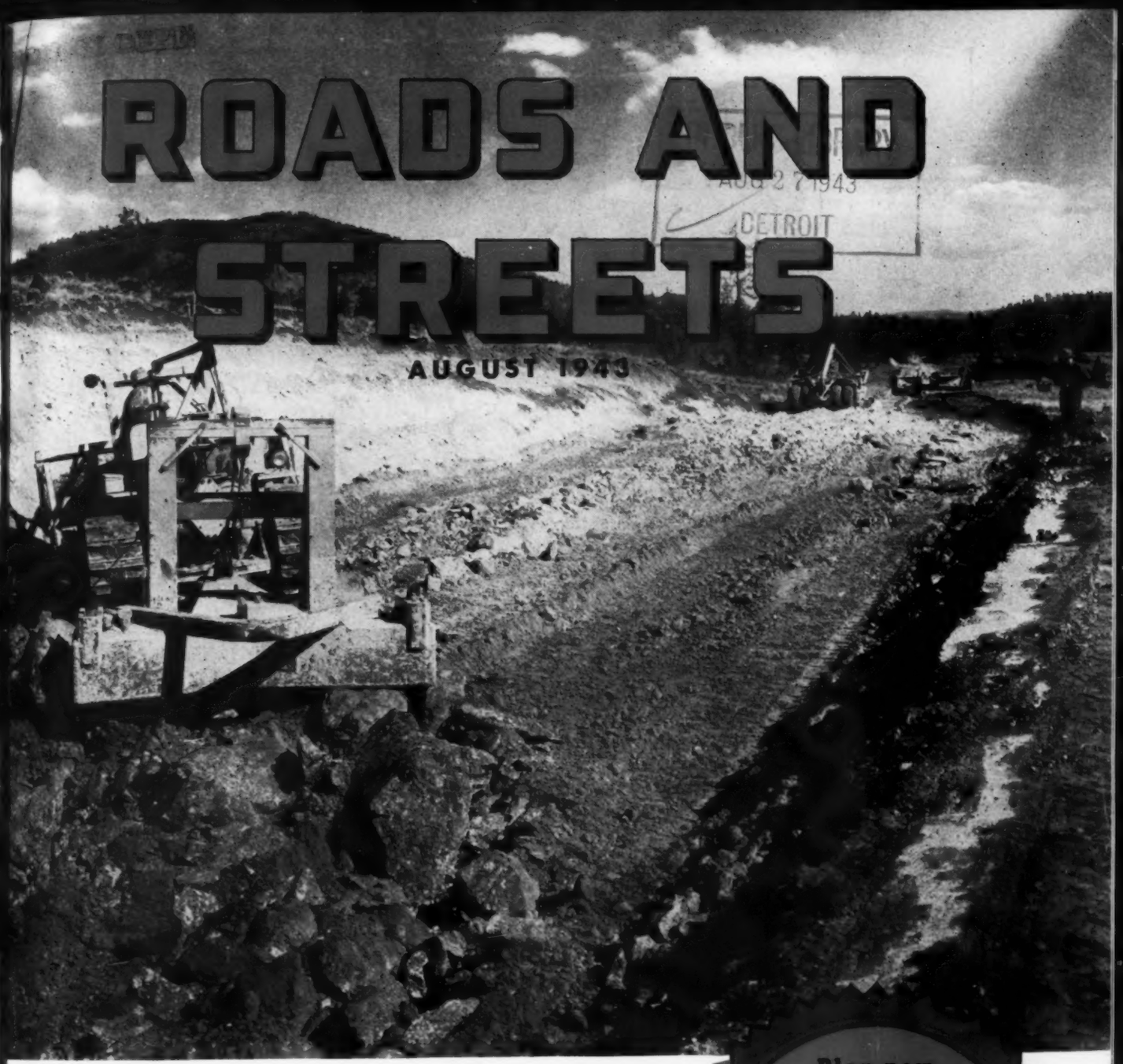


AUG 27 1943
DETROIT

Road in the Rough

From the breaking of the ground to the laying of the top surface, Timken Tapered Roller Bearings speed up and economize every operation in road construction.

They enable equipment of all kinds to operate faster and smoother; and to stand up longer with less attention for lubrication and general maintenance.

Shown in the foreground of the photograph is a Le Tourneau Rooter operated by a "Caterpillar" Tractor, breaking up stone; in the background a Le Tourneau Carryall Scraper is at work. All these machines are equipped with Timken Bearings. The Timken Roller Bearing Company, Canton, Ohio.

Plan now for post-victory. Prepare your equipment to meet any competitive condition; use more Timken Bearings.

★

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

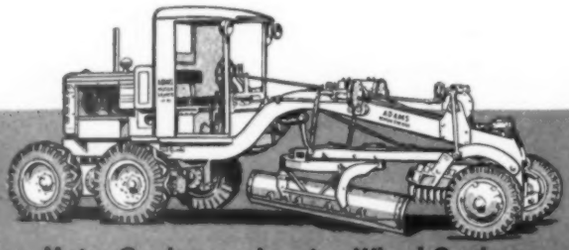
ADAMS GRADERS

Build Bases for Bombers

IN ENGLAND

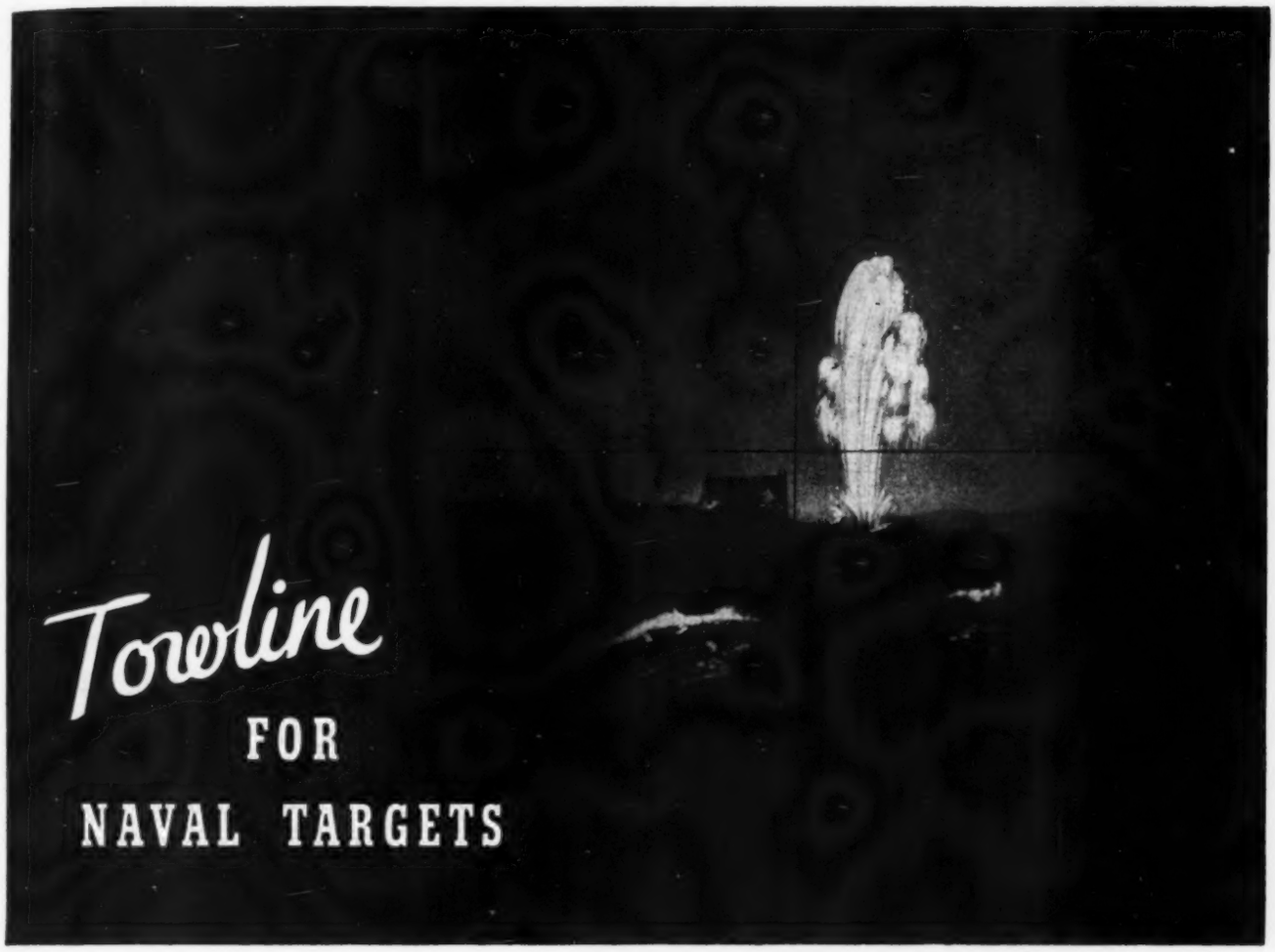
Based at hundreds of airfields throughout the length and width of England are the fleets of Allied bombers that regularly and relentlessly shower destruction on vital Axis installations. To carve these bases from the rolling countryside, earth moving on a scale unparalleled in English history has been accomplished—a job upon which many ADAMS GRADERS have long been working . . . At the bases runways and perimeter tracks have been leveled and graded—roads built connecting them with the revetments where planes and stores are concealed. Access roads to the bases, training fields and war factories have been constructed and excavations made for vast underground installations and water reservoirs . . . In England and throughout the world ADAMS machines have kept steadily and efficiently at work to complete vital war projects *on schedule* . . . After Victory you will find them equally efficient and trouble-free on your peace-time projects!

J. D. ADAMS COMPANY, INDIANAPOLIS, IND.
Sales and Service Throughout the World



Motor Graders • Leaning Wheel Graders
Elevating Graders • Hauling Scrapers, Etc.

Adams
ROAD-BUILDING and EARTH-MOVING EQUIPMENT



A taut steel rope angles down into the boiling wake, so small in proportion to the vessel that it seems like a fishing line over the stern of a rowboat.

Far off over the rim of the horizon, there's a flicker of light followed by a sound like distant thunder. The steel rope jerks as if some huge sea monster were nibbling at it.

The steel line is not for fishing. It's a target-towing hawser. The distant thunder comes from the big guns of a battleship. The "nibbling" is the impact of heavy shells upon the target.

Naval target-towing hawser is one of the many special war ropes now being produced by Bethlehem Steel Company. Because of its great length, this rope must be light yet incredibly strong. It must also resist corrosion by sea water. To solve this particular problem, Bethlehem developed steel rope wire with very high strength and shock resistance. This wire is coated by the exclusive bethanizing process. Bethanizing is an electrolytic coating process which produces the purest, tightest, most uniform zinc armor ever applied to rope wire, and yet does not reduce the toughness or fatigue-resistance of the wire.

Every foot of wire rope made by Bethlehem is helping in some way to win the war. We're working 168 hours a week to supply the battlefronts and yet not neglect the mines, quarries, mills, factories and dozens of other "musts" at home.

BETHLEHEM STEEL

ROADS AND STREETS

Vol. 86, No. 8 • August, 1943

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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Published by Gillette Publishing Co. Acceptance under the Act of June 5, 1934, authorized January 25, 1938, at Chicago, Illinois. Subscription price $3.00 per year in the United States, $3.60 per year in Canada, $4.00 per year for foreign mailing.

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GILLETTE PUBLISHING COMPANY

330 S. Wells St., Chicago (6), Ill.

ESTABLISHED 1904

PUBLISHERS OF

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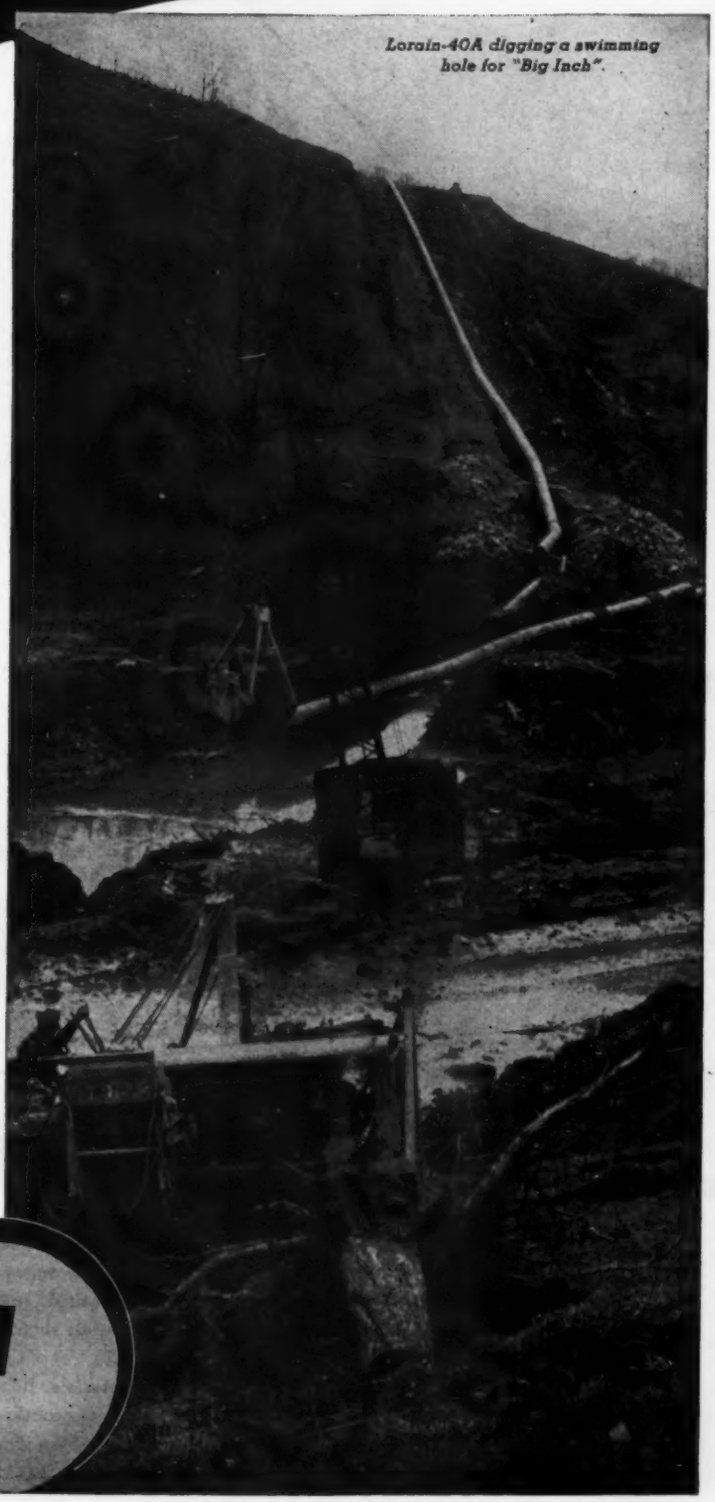
There's more to conservation than building pipelines

PLEDGED
CONSTRUCTION EQUIPMENT CONSERVATION



Lorain-40A digging a swimming hole for "Big Inch".

WHETHER it's pushing the "Big Inch" across the continent, or hustling to completion any of the other thousands of wartime pressure jobs—construction equipment is taking a terrific beating today.

Jobs are tough, hours are long, delays are inexcusable—and there just isn't any more equipment available to help carry the load. It's plainly a case of "getting more out of what you've got".

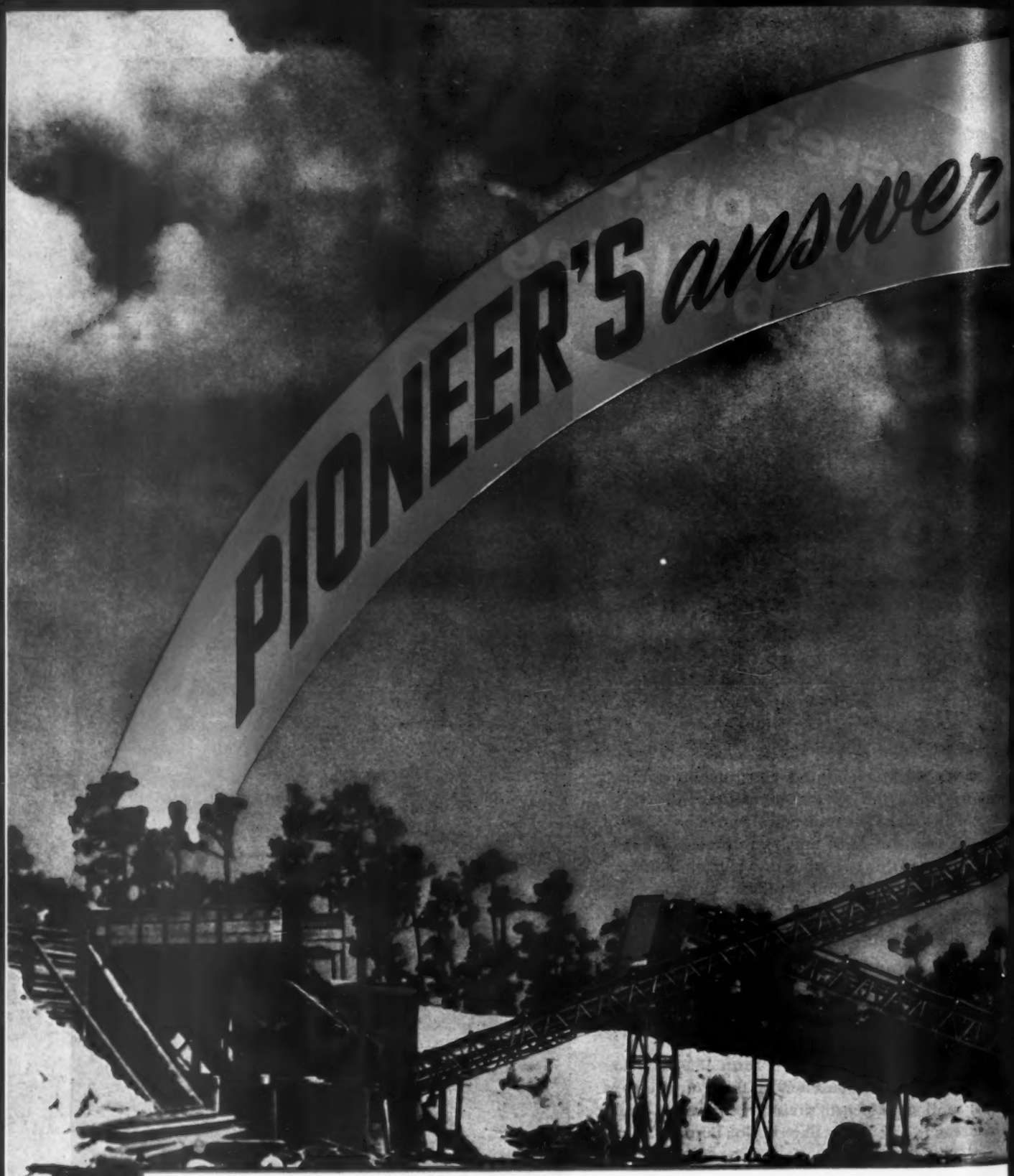
That's why conserving construction equipment is one of the "musts" for smart contractors—and one of the reasons you'll find this Conservation emblem on so much equipment. Whenever you see this red, white and blue emblem on a crane, shovel, tractor, bulldozer or truck, you can be sure that the man on the driver's seat is

1. Working hell out of his machine
2. Taking care of it with proper lubrication, adjustments and all the other things that will help it to come back tomorrow for *another big day.*

Want to join the more than 15,000 who already have this emblem on their machines? Just mail a postcard giving your name and address to The Thew Shovel Co., Lorain, Ohio.

thew **LORAIN**
Registered Trade Mark

CRANES · SHOVELS
DRAGLINES · MOTO-CRANES



One of the big problems on the big airbase jobs these days is to produce sufficient quantities of suitable aggregates. Concrete construction requires sized, crushed, and washed aggregate. Bituminous surfacing materials should be crushed and sized.

In most cases, there is little choice of materials. It is necessary that the aggregate plant be capable of processing any available materials so they are suitable for the job.

Here is Pioneer's answer. A semi-portable plant that is complete with steel bins and conveyors, both designed to be knocked down for moving.

The plant consists of a traveling grizzly feeder—a 30"x 42" primary jaw crusher—a 54"x24" secondary roll crusher—a 40"x22" final roll crusher—a 4'x16' vibrating screen—four steel storage bins—washing equipment—lattice frame belt conveyors and Diesel power.

The complete plant was designed by Pioneer Engineers —factory built and shipped complete with all necessary

drives, spouting, and everything except the foundation

One manufacturer is responsible for all the equipment. It is a balanced plant, without a bottleneck. It is easy and quick to set up as soon as it arrives on the job.

This plant will operate in quarry rock or gravel and it will produce clean, graded, crushed aggregate. If necessary, it will produce sand from quarry rock.

Maybe Pioneer can answer your problem too.

Pioneer

ENGINEERING WORKS

Minneapolis, Minnesota, U. S. A.

© 1943 Great American Industries, Inc., Meriden, Conn.

Military requirements called for hundreds of efficient pumpers—quickly—to combat all kinds of fires which might threaten stores and equipment.

As producers of fire apparatus for many years, it was natural that Ward LaFrance received the assignment. Standard truck chassis were converted into 500 gallon-per-minute pumpers, reinforced and equipped for their special job.

Ordinarily, it is preferable to design and build special trucks "from scratch". In this case it was practical to convert standard trucks to special-purpose use, because of the availability of the chassis units.

The moral is: When civilian motor truck purchases again become possible, put your *special* requirements up to Ward LaFrance. You'll get greater efficiency and longer useful life for every truck in your fleet. *Right now* is a good time to discuss your problems and future needs with Ward LaFrance engineers.

WARD LAFRANCE TRUCK DIVISION

★ GREAT AMERICAN INDUSTRIES INC. ★

ELMIRA, NEW YORK

WARD LAFRANCE

BLACK TOP ROAD MAINTENANCE EQUIPMENT

The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Cantonments; Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will again help to make this world a better place in which to live. Littleford, since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

LITTLEFORD BROS., INC., 454 E. Pearl St., CINCINNATI, OHIO

Just like... Unrolling a Rug

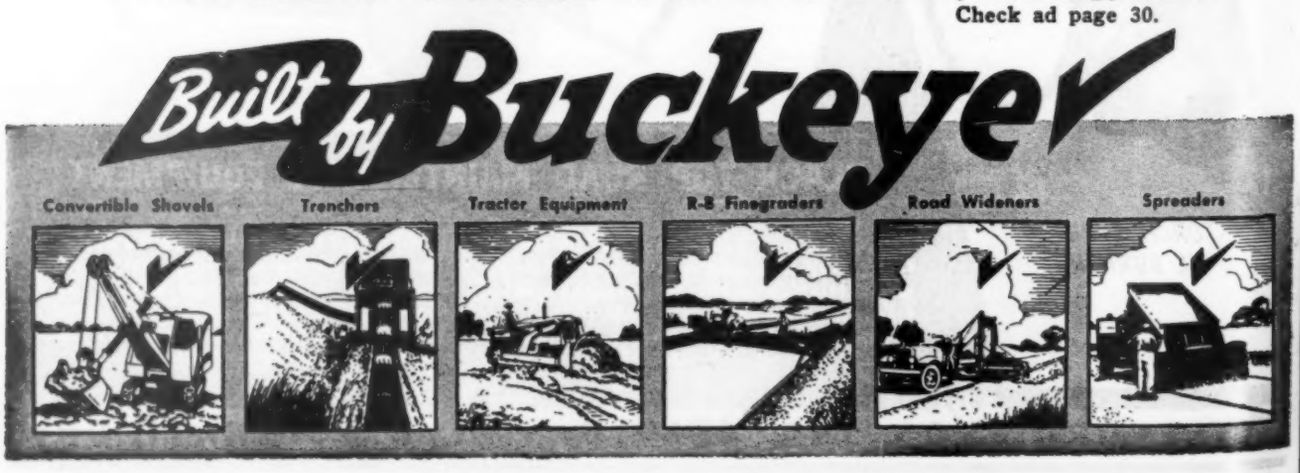
When you use a BUCKEYE SPREADER

CONTROL is the keynote of Buckeye spreading. Signed reports from users consistently tell of accuracies as high as 99% on both thickness of spread and consumption of materials. Labor savings of 50% and material savings of 20% and more are commonly reported.

Act now to secure these benefits. The new BUCKEYE SPREADER BULLETIN explains the power driven feed roll that grips the material and lays it down as smoothly as unrolling a rug; also gives complete design and construction data, specifications, etc. Write for a copy today.

THE BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Check ad page 30.



YOU CAN'T MISS...

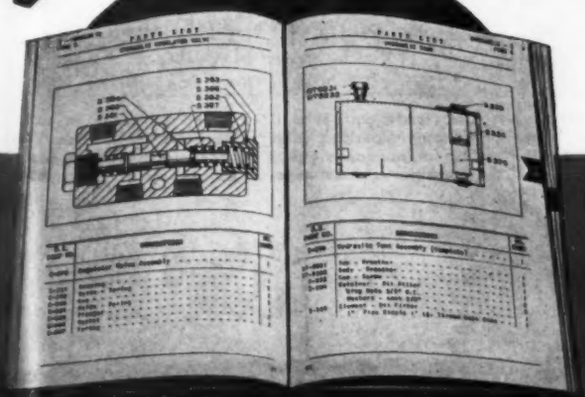
You can't miss enjoying better performance . . . lower upkeep cost . . . improved lubrication . . . complete parts information . . . with the new BLAW-KNOX CONSTRUCTION EQUIPMENT MANUALS.

These instruction manuals are real hand books which illustrate and explain every part of the machine, even the engine drive down to the smallest cotter pin and lock washer.

The manuals tell how to operate the equipment efficiently . . . how to lubricate correctly . . . how to make adjustments and repairs . . . how to diagnose troubles—how to overcome them. They include complete parts lists.

All the manuals are fully illustrated with detailed pictures and drawings . . . all information is completely cross-indexed and easy to find.

With these new manuals, users of Blaw-Knox Construction Equipment can reduce "time-outs" for replacement and repairs, improve and simplify maintenance, establish a more correct lubricating procedure, and enjoy more continuous and satisfactory operation on the job.



6" x 9"
PAGE SIZE

Owners of the latest models of Blaw-Knox Construction Equipment can obtain copies of the manuals shown above by writing for them on their business letterhead, stating the *model* and *serial number* of each machine.

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2067 Farmers Bank Building, Pittsburgh, Pa.
NEW YORK • CHICAGO • PHILADELPHIA
BIRMINGHAM • WASHINGTON
Representatives in Principal Cities

★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★

WATCH Your Lubrication!

Your present excavating equipment will probably have to last for the duration. Under pressure for more and more output in its vital service on the production front, it is operating at top capacity, — very likely three shifts per day.

Good lubrication care, more than anything else, is the most effective maintenance insurance you can obtain. Proper lubrication will extend the life of your excavator, it will avoid breakdowns, will reduce cost of operation and increase output by reducing delays.

To keep your equipment in fighting condition, do these things:

Lubricate each part regularly and thoroughly as prescribed by your manufacturer's operating instructions.

Use the **right amount** of lubricant. Too much can sometimes be harmful.

Use the **right lubricant** as specified for each fitting and part. A good lubricant when applied in the wrong place may be more harmful than none at all.

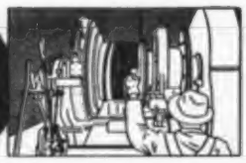
Use only **good quality** lubricants. "Cheap" oils and greases are dangerous to the machine.

KEEP LUBRICANTS CLEAN

BUCYRUS ERIE

A good operator takes pride in his machine. He keeps it clean and trim and properly lubricated always. It pays off in smooth, continuous performance, maximum production, and long operating life.

HERE ARE A FEW SPECIAL POINTS TO WATCH



1. Ropes and drums should be lubricated regularly. Apply a thin layer often to avoid splatter in operation

2. Be sure to lubricate the suspension ropes. They are likely to rust their strength away if you don't.

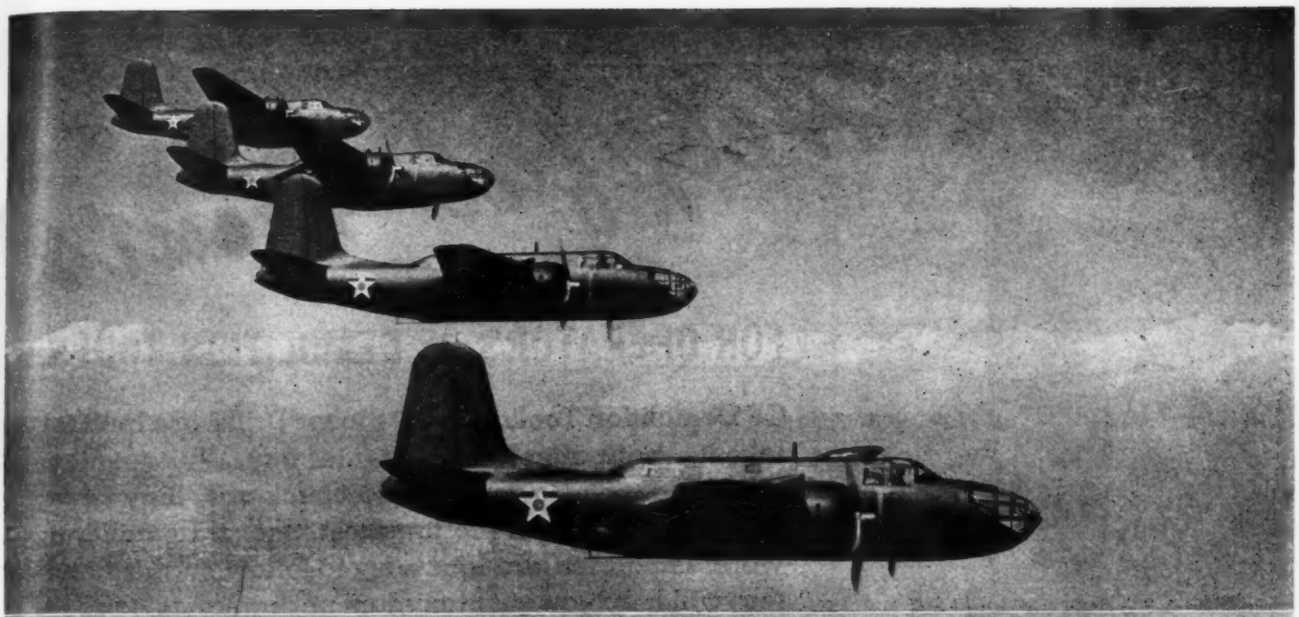
3. Lubricate cats even if machine is not propelled much, as normal digging reactions cause some wear

4. Keep the proper amount as well as the correct grade of oil in your gear enclosures at all times.

ARMY E NAVY

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



. . . that they may have a Happy Landing!

WHEN these Army Air Force Bombers return from their mission over enemy targets, they must have a happy landing—runways that are long, wide and level.

Barber-Greene machines, in the hands of the Army Engineer Corps, are building those advance base runways faster and better—and on time! In every theatre of operation in the world, Barber-Greene runways are giving a fighting Army or Navy air force pilot a smooth take-off—his last feel of earth. Those runways first welcome him back, his mission successfully accomplished.

Runways built by Barber-Greene equipment speeded President Roosevelt, our Commander-In-Chief, to his momentous meeting with Prime Minister Churchill at Casablanca.

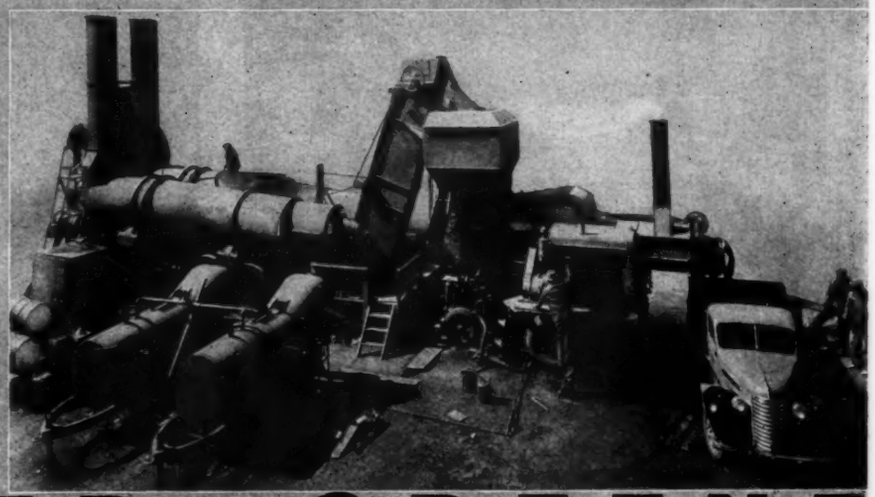
Standard B-G Asphalt Mixers, Finishers, Dryers, Loaders, tested and proved by many thousands of peacetime construction jobs, were ready when the Army needed them. Today, their production vastly increased, they are literally building the foundations for victory.

You can investigate this equipment now for your future needs—when victory is ours you will be ready with complete information. Our catalogs are yours without obligation. Write to: Bituminous Equipment Sales, Barber-Greene Company, Aurora, Ill., U. S. A.

Below is the Army Airport Plant, built by Barber-Greene for the Army Engineer Corps, and used in every theatre of operation in the world. Production of this equipment—THE STANDARD B-G LINE—has been vastly increased to help speed victory.

ARMY E NAVY

Awarded August, 1942



43-2

BARBER-GREENE

Four Helpful Hints

FOR OPERATORS OF DEMOLITION TOOLS

CP Demolition Tools, like CP Sinker Drills, are built to take it — hour after hour, day after day. With regular lubrication and a few simple check-ups, they give top performance in the toughest kind of demolition work. Illustrated are four easy-to-follow suggestions that will help you get maximum performance, longer spring life and minimum maintenance costs with CP Demolition Tools. Other helpful hints will appear in future advertisements.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP DEMOLITION TOOLS

1 Check backhead nuts every day. Keep them tight. If nuts are loose, tool will lose air.

2 Tighten fronthead bolt nuts evenly. Do not compress springs. Leave ⅛" space between coils.

3 Before putting tool away, clean with air hose. Plug air inlet and exhaust with rags or waste.

4 Even a CP Demolition Tool needs a sharp peg point. Check points daily — keep them sharp.

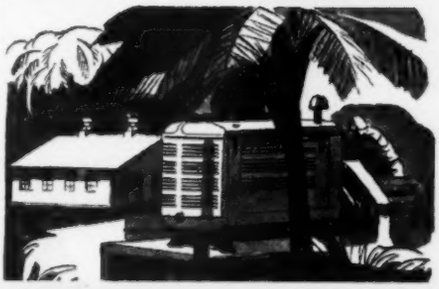
★★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

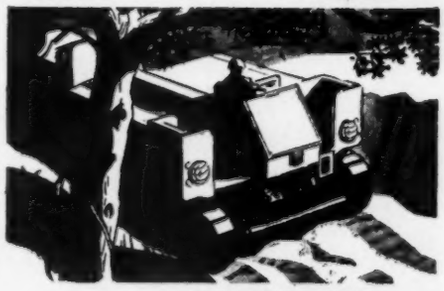
CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

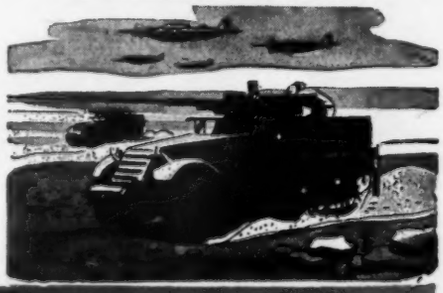
★★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

20.001 Businesses

At right: A few Harvester products in wartime . . . tractors, power units, trucks, prime movers, half-tracks.







THERE is no business so big that it can operate without the help of other businesses. Indeed, the larger the business the more help it requires from others and the more help others receive from it.

So it is with International Harvester. We buy an almost infinite number of things from thousands of other companies, the vast majority of which are small businesses. We buy raw materials, supplies, finished and semi-finished parts and sub-assemblies, as well as services of all kinds. These companies which sell to us to fill our orders, buy in turn from many others.

We are a customer of more than 10,000 different businesses, and we market our products through more than 10,000 other businesses. Thus, in our operation on a national scale, 20,000 businesses look to us either as customers or as suppliers of a variety of merchandise.

Many of our relations with these firms now center around war orders. Many of these orders are such that they can best be handled by a large company in order to obtain the speedy production essential to the war program. A large company, with a large, experienced, and versatile organization, is best fitted to coordinate the facilities and abilities of many companies. We have done our utmost to bring the maximum number of smaller companies into the filling of war orders. We need their help, they need ours.

We want little business to survive the war. America's economy cannot be healthy, cannot provide employment for workers or good products at low prices for customers, unless small business, medium-sized business and big business are all functioning, each at the job it can do best.

America, after the war, will need them all.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

MAJOR WAR PRODUCTS BUILT BY INTERNATIONAL HARVESTER

Half-Track Military Vehicles Torpedoes Artillery Prime Movers
Automatic Airplane Cannon Oerlikon Gun Mounts
Military Trucks Military Tractors Steel Products for Military Use
Aerodrome Control Trucks Armored Scout Car Hulls
High Speed 155 mm. Gun Carriages Gun Loaders
Airplane Engine Cowling Assemblies
Tank Transmissions Blood Bank Refrigerators
Shells Gun Carriages Adapter Boosters
Trackers Marine Corps Invasion Ice Chests

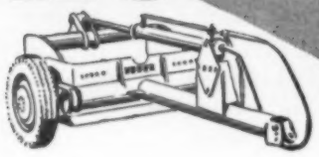
Invest in America ★ Buy MORE War Bonds

POWER FOR VICTORY
INTERNATIONAL HARVESTER

O. W. I. PHOTO

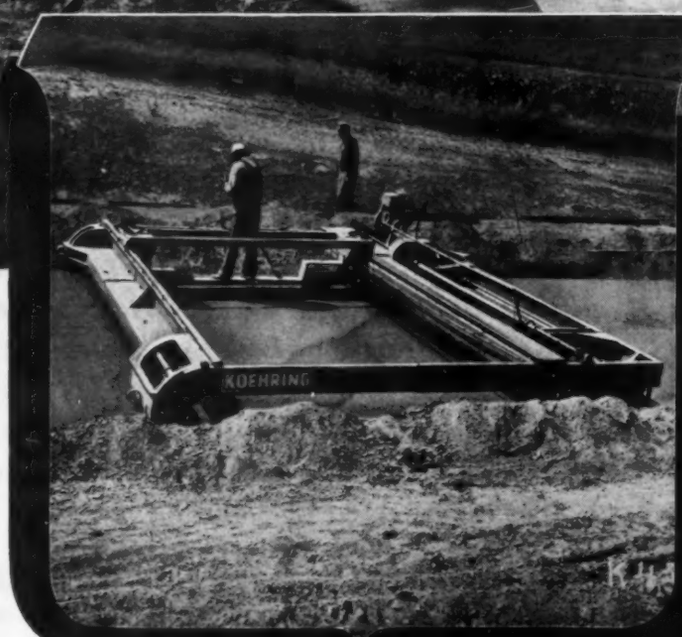
★ Modern mechanized warfare depends on mobility for its successful prosecution. This means airports and highways must be kept in constant repair. Huber Rollers, Speed Scoops and Bulldozers are doing this very job. Near many fighting fronts they are putting captured airports in shape so our airmen can have the advantage, and rebuilding highways the enemy tried to destroy so our troops and supplies can move forward unhampered.

HUBER *Automotive Type* ROLLERS



SPEED SCOOPS - BULLDOZERS

SPEED + ACCURACY IN FINISHING



High spots are removed and low spots filled by the Longitudinal Finisher without changing density of the surface concrete.

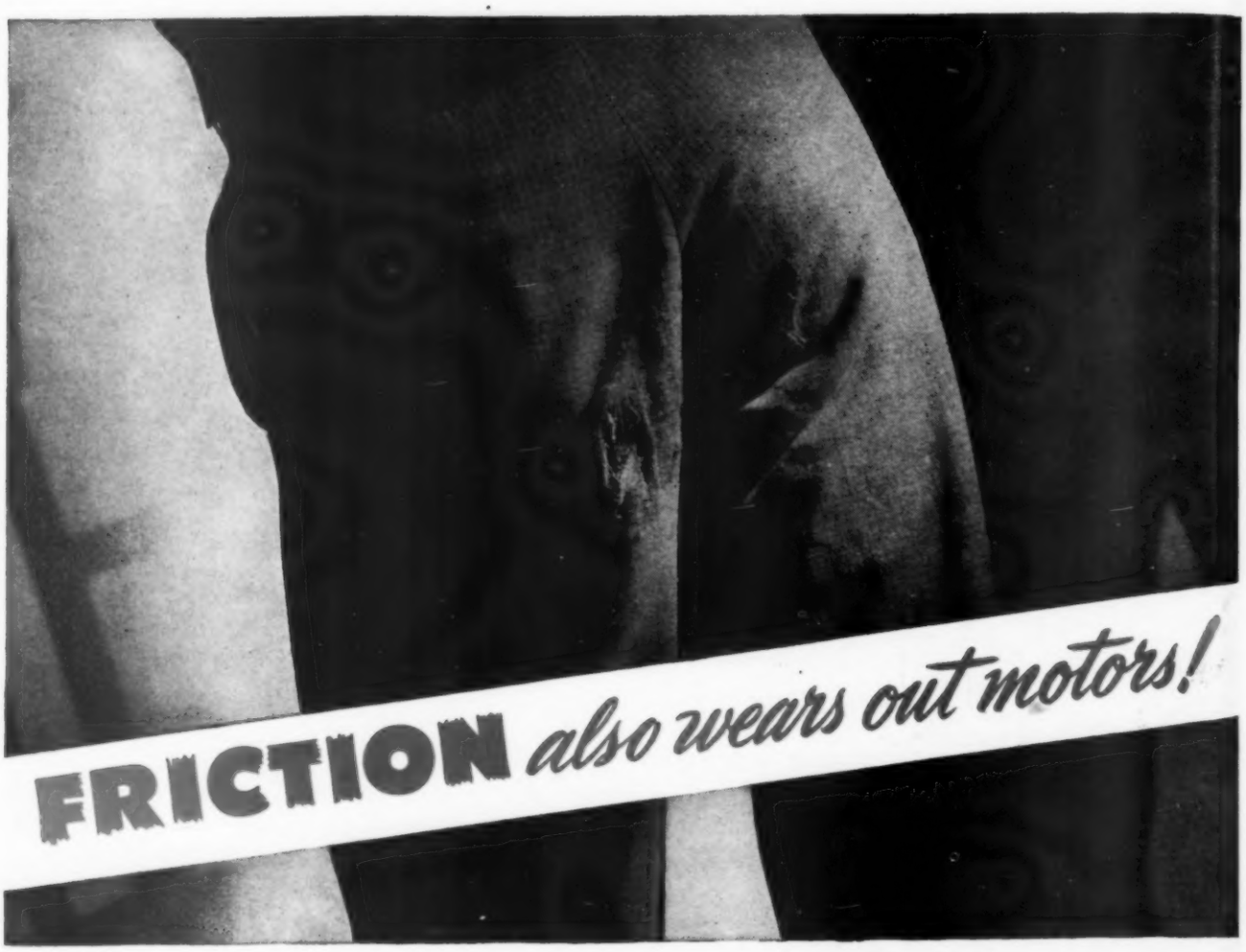
AT ANY PAVER SPEED

With a Koehring Longitudinal Finisher it's easy to meet the high speed production of your paver and still maintain surface accuracy in accordance with job specifications. Finishing speed does not affect this accuracy . . . the Finisher speed can be easily adjusted to keep pace with the paver. Koehring Finishers are designed to do accurate finishing at the proper time — immediately after the initial set. With a Koehring your concrete surface is consistently accurate — as accurate at the end of the day as after the first pour.

KOEHRING COMPANY
MILWAUKEE · WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT



A pair of pants is not as hard to replace as vital motor parts— but in either case, you're more interested in protection than in replacement. Macmillan RING-FREE Motor Oil *protects* pistons... rings... valves... bearings because it reduces friction faster!

Reduced fuel consumption is proof of friction Reduction!

If friction is reduced, more horsepower is released to the drive-shaft—and this extra horsepower should be measureable in reduced fuel consumption. * Compare RING-FREE with *any* other motor oil on that basis under similar conditions!

RING-FREE removes carbon

Carbon removal is a natural RING-FREE function, inherent in the crude oil and retained by the exclusive Macmillan patented process. RING-FREE removes carbon while the motor runs!

*

In 1094 certified road tests, with various makes of owner-driven cars, the average *immediate* saving of gasoline was 1.3 miles per gallon after crankcases were drained and refilled with RING-FREE. In many types of Diesel operations, as much as 25% reduction in operating costs (including maintenance and fuel) are reported. At the same time, oil consumption is reported decreased!

Macmillan RING-FREE Motor Oil combines all these qualities: 1—Removes Carbon, 2—Reduces Friction *Fast*, 3—Saves Fuel, 4—Has Great Film Strength, 5—Has High Heat Resistance, 6—Long Cling to Metal, 7—Fast Penetration, 8—Is Non-Corrosive, 9—Is Less Affected by Dilution.

Macmillan Petroleum Corp.

50 W. 50th, New York • 624 S. Michigan Ave., Chicago • 530 W. 6th, Los Angeles

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MACMILLAN
RING-FREE
MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION

Keep 'em all flying

A copy of this United Nations poster, measuring 24" x 37" will be sent (while the supply lasts) to anyone who requests it on a company letterhead. Write to Koppers Company, Dept. A, Pittsburgh (19), Pa.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

LULL BEFORE THE STORM— *Photo Courtesy U. S. Marine Corps*

A detachment of U.S. Marines pauses in a jungle clearing for a brief rest en route to the front on a Jap infested island. Shortly after this photo was snapped, these Leathernecks drove an enemy band far into the hills.

ALWAYS ON THE MOVE . . . FIRST IN BATTLE . . . NEVER SAY QUIT—TOUGH, HARD-FIGHTING MARINES HAVE WHAT IT TAKES IN MEN AND EQUIPMENT!

Here the Drott Bull Clam Shovel clears site preparatory to making trench.

In seven minutes, digs trench and builds protective bank on the side.

Digging, clawing, busting its way through out-of-the-way jungles . . . where neither man nor equipment have ever trod . . . the Drott Bull Clam Shovel, manned by the Marines, builds airports, trails and roads; throws up barricades, protects and helps the men whose work makes us so proud.

Many of the countless applications of the Drott Bull Clam Shovel fully described in our literature. Wire or write for it.

DROTT
UNIVERSAL
EQUIPMENT

HI-WAY SERVICE CORPORATION
3841 W. WISCONSIN AVE., MILWAUKEE, WIS.
739 MUNSEY BUILDING, WASHINGTON, D. C.

Full Loads...Short Hauls

Two Years' Driving with No Time Out

... and this FWD is still going strong

Stop-and-go short hauls day afer day, with 12-ton loads, is a tough test for *any* truck.

But this FWD in Appleton, Wisconsin, has been on the go for two years in just that kind of service. This FWD is owned by P. J. Heenan, owner and operator of the Eastern Transportation Co. "Not since we purchased this truck have we been tied up or lost time," writes Mr. Heenan.

Mr. Heenan purchased this FWD truck (a T-26 tractor) in August, 1941. It is used daily on Eastern's Manitowoc-Appleton run. In over 50,000 miles, the gasoline economy on this short haul averaged 4.6 to 5 miles per gallon, with loads up to 12 tons.

Extra ruggedness and dependability are built into FWD trucks. Owners know that FWD's never become "orphans" — that progressive interchangeability of vital parts keeps FWD's in service far beyond normal expectancy.

The full-powered traction of four driving wheels is vital for today's transportation tasks. See your FWD branch or dealer and get the whole story.

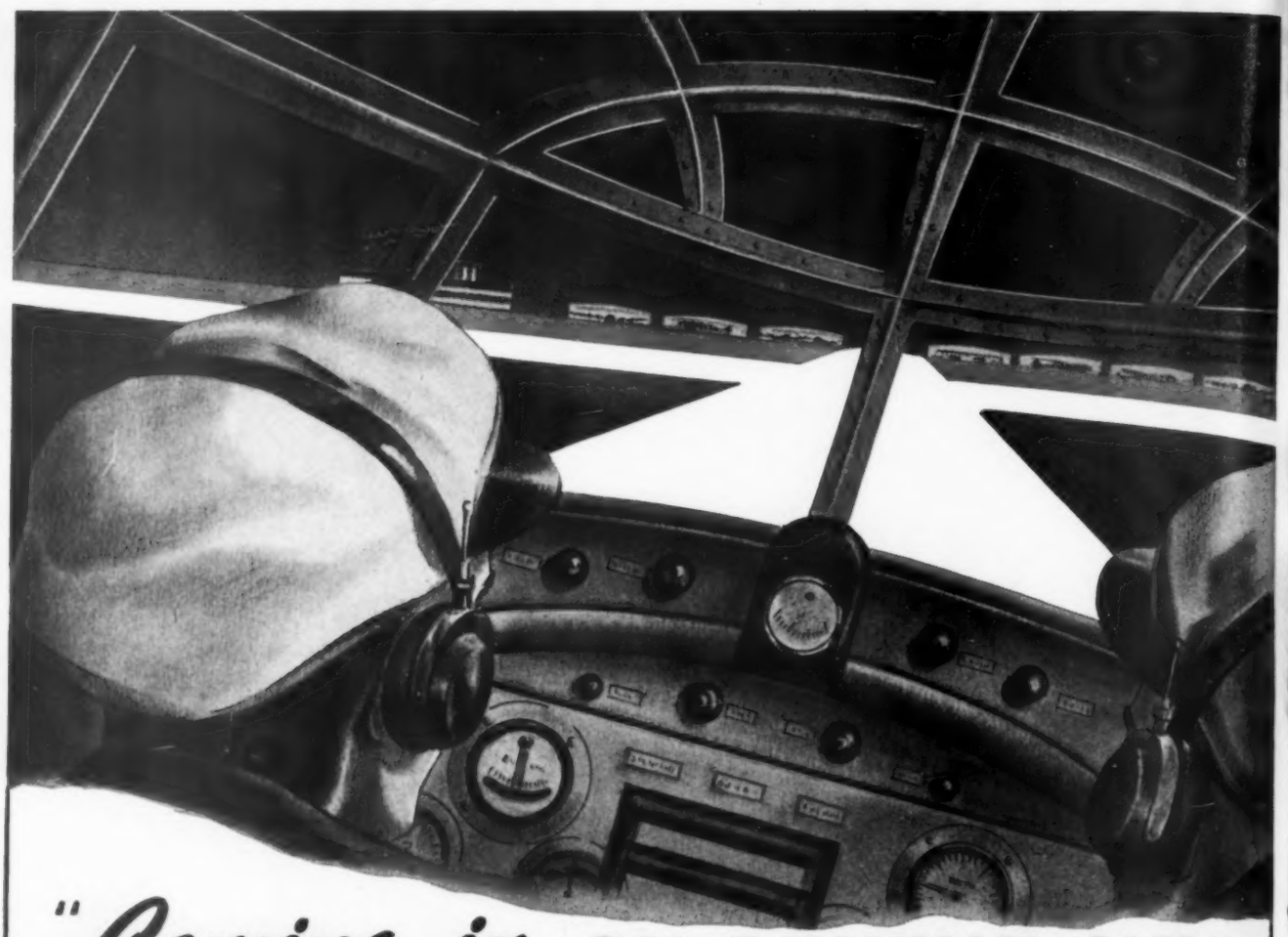
THE FOUR WHEEL DRIVE AUTO COMPANY
CLINTONVILLE, WISCONSIN
Canadian Factory: Kitchener, Ontario

Mr. P. J. Heenan, owner and operator of the eastern Transportation Co., keeps in touch with operations. He's always "on the go," like his FWD.

The Two Four-Wheel-Drive Principles with Center Differential Asks Less for Tires — Gas — Oil — Replacements.

FWD TRUCKS

IN EVERY FIELD WHERE TRUCK QUALITY IS PUT TO THE TEST — FWD's STAND UP!



"Coming in ON RUNWAY SIX"

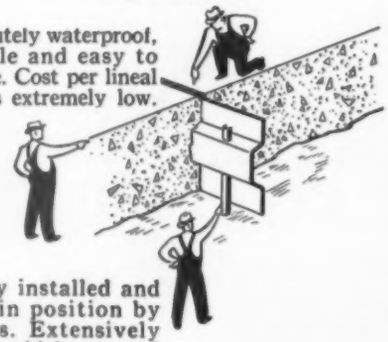
Ever land a big transport plane at 100 miles an hour? . . . The pilot's report to the control tower wouldn't be so matter of fact if he didn't know that wide, smooth strip of concrete was specially engineered for his landing.

There is no place for buckling or blow-ups on runways with planes that weigh many tons coming in at high speeds. Airport designers and contractors have been quick to recognize the value of Keystone Mastic Board Center Strip in their runway paving. The special trapezoidal tongue and groove design of this joint allows for normal expansion and contraction that assures constant surface smoothness.

Keystone Mastic Board Center Strip, for both longitudinal and transverse joints, is formed from ageless asphalt and mineral fillers. No critical metals are used in manufacturing this waterproof, rigid tongue and groove joint that has the full approval of the U. S. Engineers, Navy Department and Bureau of Roads.

Tongue and groove joints allow for normal expansion and contraction preventing buckling or blow-ups.

Absolutely waterproof, flexible and easy to handle. Cost per lineal foot is extremely low.



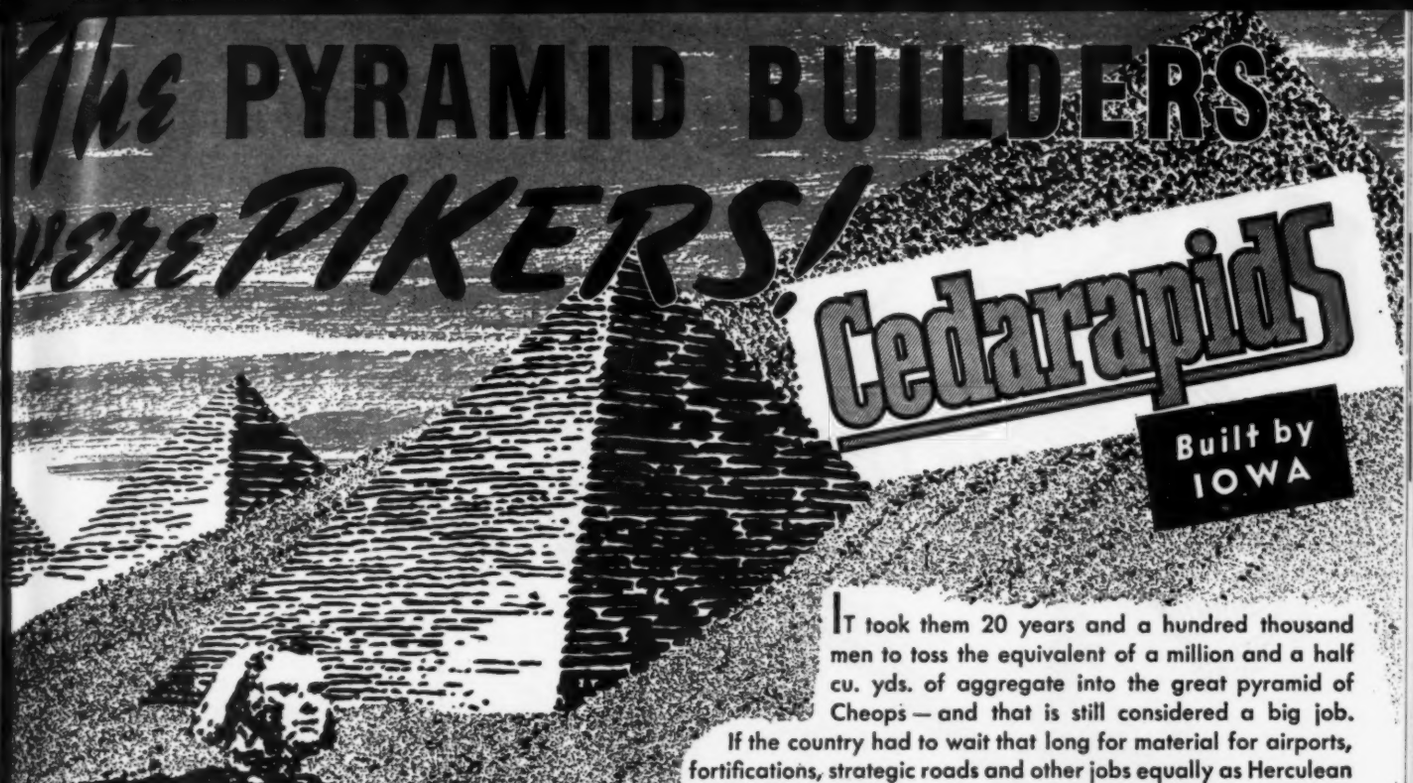
Easily installed and held in position by stakes. Extensively used on highways and industrial floors as well.

Write today for complete information and the new Keystone Paving Products Catalog.

Keystone
ASPHALT PRODUCTS CO.

A DIVISION OF AMERICAN-MARIETTA COMPANY • 43 E. OHIO STREET • CHICAGO

The PYRAMID BUILDERS were PIKERS!



Cedarapids

Built by IOWA

OVER ½ a Million tons in less than nine months from one CEDARAPIDS Crushing Plant for HENRY STAFFORD

Lamesa, Texas

IT took them 20 years and a hundred thousand men to toss the equivalent of a million and a half cu. yds. of aggregate into the great pyramid of Cheops — and that is still considered a big job.

If the country had to wait that long for material for airports, fortifications, strategic roads and other jobs equally as Herculean as the pyramids, the war never would be won.

The Pyramid builders were pikers! The Cedarapids plant of Henry Stafford alone with its small crew is equalling this yardage in less than 2½ years. In 288 days, less than nine months and in spite of several moves this plant alone turned out over half a million cu. yds. of minus 2 in. material on airport work and reached an output of 4688 cu. yds. of minus 2 in. material in one day.

This plant is an outstanding example of Cedarapids portability. All units are on rubber, including conveyors and the receiving hopper is only 9 ft. above the ground — materially facilitating feeding.

Whether it's winning a war or a peace time job, construction begins with aggregate, and when *time* and thousands of dollars worth of labor and other equipment depend on the aggregate plant you have to have dependability and *output* fast and at low cost.

Iowa Cedarapids plants — both large and small have been proved under both peace time and war time conditions. Come to Headquarters for aggregate producing and handling equipment.

IOWA MANUFACTURING COMPANY
Cedar Rapids Iowa

BEEHIVES with a sting — squat, low, concrete igloos that were needed in a hurry, house the ammunition backlog of our fighting forces.

Necessity is the mother of invention and development. In answer to the need for speed, Foote Company engineers have found a way to reduce the handling time and costs by further development of the MultiFoote inclined boom so that pouring could be accomplished directly to the forms by the paver.

War developments like this are going to mean new speed and lower costs on peacetime contracts. Because there are more MultiFoote pavers in service than any other make, the varied problems faced by Foote Company engineers are greater, and the result is more complete experience which in turn results in better machinery and a better answer to your paving or building problems. If you have never had a MultiFoote, why not let us send you complete details? — Let's get acquainted!

THE FOOTE COMPANY, INC., Nunda, N. Y.

World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

MULTIFOOTE

CONCRETE PAVERS

Top: Baker Bulldozer-equipped tractor compacting runway with sheepsfoot rollers on a Southwest Pacific Island.

Center: Tree dozing for a landing strip at Guadalcanal with a Baker Bulldozer.

Bottom: A Seabee clearing land for a landing field in the Southwest Pacific with a Baker Bulldozer.

Top and bottom pictures: "Official U. S. Navy Photographs."

SEABEES USE BAKERS TO BEAT JAPS ON SOUTH PACIFIC ISLANDS

Tree Dozing, Leveling and Grading Speeded to Completion

Hogging out landing strips and airports on South Pacific islands, despite almost continuous air and land attack, was speeded to completion with Baker Bulldozers and Gradebuilders. Seabees, U. S. Engineers and other construction units used these versatile tractor units to hasten many construction jobs.

Tree dozing and jungle clearing, road building, leveling and grading landing strips and air fields—all were taken in stride and speedily finished.

Top Brace Is Safety Factor

In jungle dozing, the overhead brace on Bakers was found to be a valuable safety factor as falling palmetto and other trees could not fall on top of the tractor operator. Flexibility of blade lift made tree dozing simple as hydraulic control allowed for inching the blade up the tree trunk for increased leverage pushing after the fall was started.

Hydraulically operated blade control, full down-pressure and smooth lift simplified grading and leveling despite the inexperienced operators, adding to speed of operations and quality of construction.

Bulldozer-equipped tractors were also widely used for pulling sheepsfoot rollers and other equipment and for hauling loaded wagons and trailers.

THE BAKER MFG. CO.

BAKER

The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

THE UNION METAL MFG. CO. · CANTON, OHIO

Cargo Booms — Top Masts — Practice Bombs — Recoil Mechanisms — Gun Mounts — and, in peacetime, Steel Street Lighting Standards — Monotube Steel Pile Casings — Steel Skids and Boxes — Monotube Steel Poles for Distribution and Transmission Lines

MARION . . .

DIGS INTO THE FUTURE

Not to recognize progress even in time of war is to overlook half the battle. Marion, through its war work, has learned of new things about speed, power and stamina—strength with light weight—the use of new metals—the application of balanced design. These things are being recorded for the benefit of contractors when Marions are again available without priority. Appearance will have its place in postwar shovel and crane design, but Marion agrees with most owners that MAXIMUM RETURNS ON THEIR INVESTMENT COME FIRST, ALONG WITH ECONOMY FACTORS WHICH ENABLE THEM TO COMPETE SUCCESSFULLY AND MAKE MONEY ON EVERY JOB. Marion is planning its postwar machines with this in mind.

MARION

STEAM SHOVEL COMPANY, MARION OHIO, U. S. A.

HOVELS · DRAGLINES · CRANES · PULL-SHOVELS
VALKERS · CLAMSHELLS · COAL LOADERS · COAL STRIPPERS
AS · ELECTRIC · DIESEL (From 3/4 Cu. Yd. to 35 Cu. Yds.)

NEVER BEFORE IN ANY WAR...

THE MODERN *BOMBER*

nor the modern *Preformed wire rope*

THAT HELPS IT PERFORM

Yes, this is a new and different war. It's a long stride from the frail crates which crept across the troubled skies of 1918 to the modern bombers—today's fabulous flying artillery.

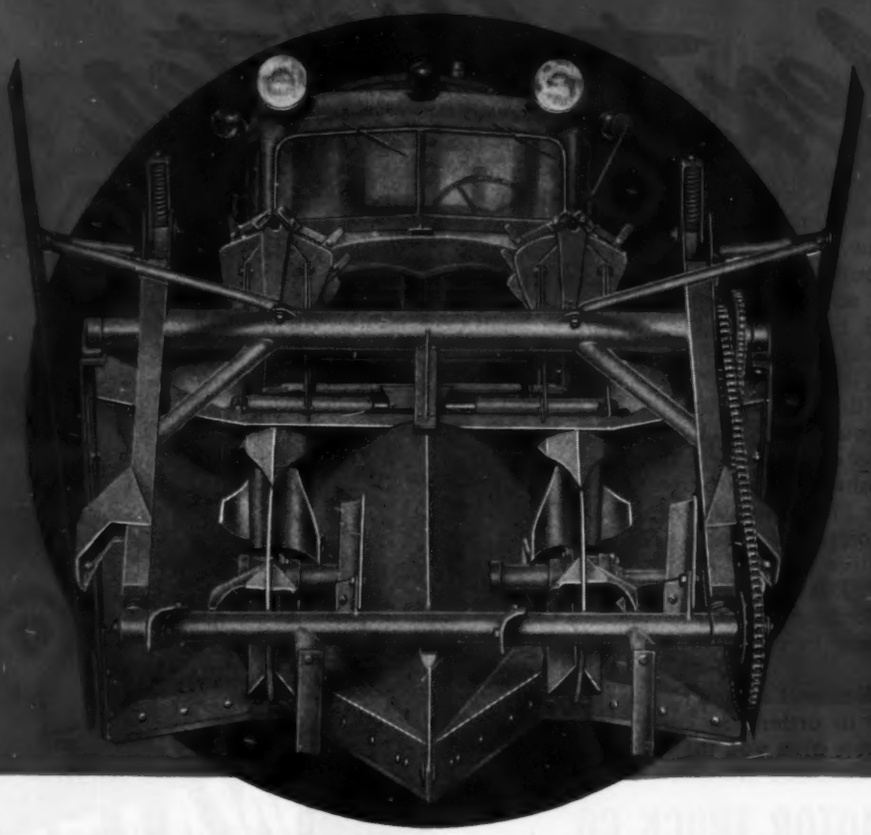
New, also, are the steel sinews of these great planes, made for the first time of Preformed Wire Rope. They convert split-second human reflexes into annihilating action. They race the decisions of alert, fighting brains to rudder, ailerons and elevators; to engines and guns; to turrets and bomb releases.

Preformed's peacetime record won this coveted war assignment. For nearly 20 years Preformed has protected and multiplied manpower. It has reduced delays from accidents and change-overs. It has cut costs. Total this—it means top-speed production, which today is imperative.

Ask your own wire rope manufacturer or supplier

BROS *Rotary* SNOW PLOW

establishes new records in SNOW REMOVAL!



Read This Statement Slowly—A Bros Rotary Snow Plow was put to work on a stretch of road blocked by drifts 12 to 14 feet high. These drifts were so firmly packed that snow plows could travel on them, and because of successive drifting, thawing and freezing, these drifts also contained several layers of blue ice, six to eight inches thick. This was the operating condition—one of the toughest ever faced—and the Bros Rotary Snow Plow cleaned that road down to the concrete.

The Bros Rotary Plow does its jobs as easily and smoothly as a reaper cutting grain. The plow is not plunged into the drifts but moves ahead at a constant pace, because, *as it moves, the revolving rake chews up the snow and ice* and feeds them to the powerful rotors, which discharge the load far to either side of the road.

Because plunging and bucking are eliminated, the Bros Rotary reduces truck maintenance and fuel consumption as much as 75%. There are no shocks or strains. All operations are hydraulically controlled from the cab. The plow may be removed from truck in less than one hour making it available for other classes of work.

Write for complete specifications, illustrations and other data. Get the details on the Bros Rotary—the plow that can do any snow job anywhere, faster and at lower cost.

WM. BROS BOILER & MFG. CO. MINNEAPOLIS, MINN.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

PLAN NOW

for the "Big Push"

Next Winter...

• In about three months, you will again be battling snow. Like military warfare, this, too, is a battle of equipment. Plan your strategy now. Check over your equipment and bring your department up to full fighting strength with sufficient Walter Snow Fighters.

Blasting big drifts, travelling icy surfaces, going through quickly where other equipment slips or stalls, Walter Snow Fighters keep ahead of traffic and keep it going. Their "big push" comes from the super-traction of the exclusive Walter Four Point Positive Drive. Its three Automatic Locking Differentials proportion the power to each of the FOUR driving wheels according to its traction at any instant.

To obtain Walter Snow Fighters on time, be early in ordering. Have your Walter distributor give you the full facts, or write us for detailed literature, today.

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave., Ridgewood, Queens, Long Island, N.Y.

...order
WALTER
SNOW FIGHTERS
Now!

Be Prepared FOR POST-WAR RECONSTRUCTION

YOUR share in the re-building of a war-worn world will, in a large measure, be determined by your operating costs . . . Today, on all fronts—at home and abroad — the dependability, operating speed and truck mobility of MICHIGAN Mobile CRANES and SHOVELS are playing a big part in the war against the Axis. And from this most exacting of "proving grounds" will come features which will be even more outstanding than those for which MICHIGAN has long been famous — improvements to help you keep costs at a minimum in meeting post-war competition.

Write for complete specifications given in Bulletin RS-83.

AIR CONTROLLED

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

"Looks like a Buckeye Trencher did it"!

You're right, it was a Buckeye.....

When you see clean, straight-sided trench and a uniform spoil bank, running alongside well back from the brink, you can be pretty sure a Buckeye Trencher did the job.

Hundreds of Buckeyes are working in the Allied cause on every continent. They're digging trench for airport drainage, to bring in drinking water and fuel gas, for sewage and to bury communication and electric cables for safety. Yes, and trench for defensive purposes, about which nothing much can be said at this time.

Standing up as they are, under the handling of unskilled operators, working under the most abusive operating conditions — sometimes even under shell fire — Buckeyes are proving again and again that they're the trenchers for *your* post-war jobs!

Model 11

Model 120

Model 410

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Check ad page 8.

50 YEARS OF PROGRESS BUCKEYE

Buckeye

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS

To Insure Year-Around Travel Over the ALCAN HIGHWAY

It's getting hotter and hotter every day in the Aleutians—*for the Japs*—but not hot enough to melt the winter ice and snow, on the strategic "life-line" to our troops in Alaska.

The Alcan Highway must be kept open, and in good condition for military transport, at all cost.

Hundreds of Marmon-Herrington *All-Wheel-Drive* converted Ford trucks helped forge this vital link between Alaska and the States, through the Canadian wilderness. Driving through mud and snow and muskeg, through brush and swamp, and over grades too steep for "ordinary" trucks to master, these powerful, sure-footed trucks, *with power and traction applied through all wheels,* played an important part in this great achievement of U. S. military engineers.

Now the same vehicles, with dump bodies and St. Paul underbody blades, remove ice and snow, haul maintenance materials, and keep grades in shape for the never-failing flow of guns, ammunition and food to our fighting men.

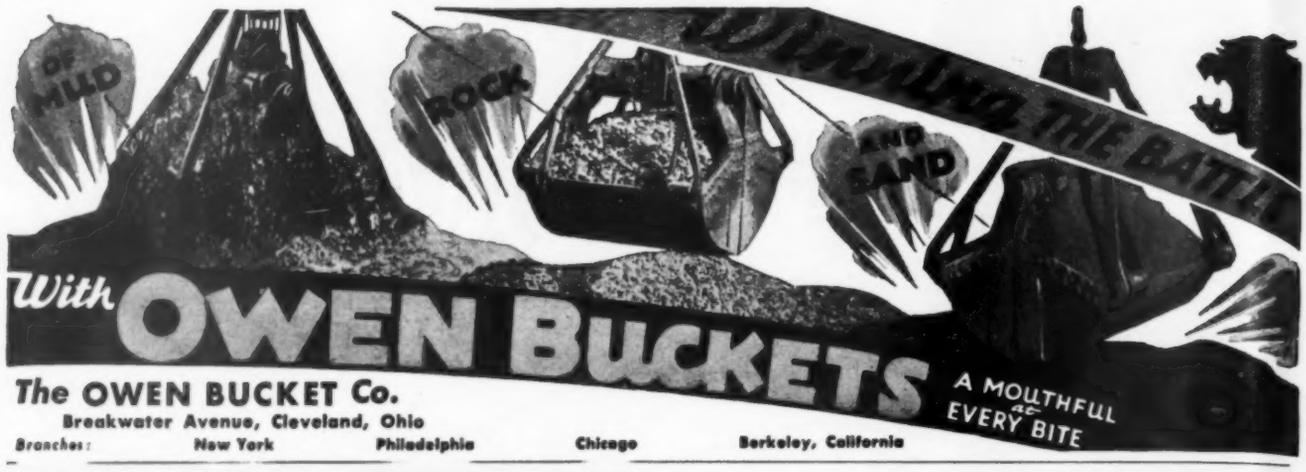
We at Marmon-Herrington are proud of the contribution our trucks have made to this great enterprise. These trucks, along with our tractors and tanks, have played an important part in the military operations of the United Nations. They have done much, and *they will do more,* for they received their "basic training" in the world's most difficult civilian services.

WHAT DID YOU DO FOR VICTORY TODAY? *BUY WAR SAVINGS BONDS*

MARMON-HERRINGTON

All-Wheel-Drive

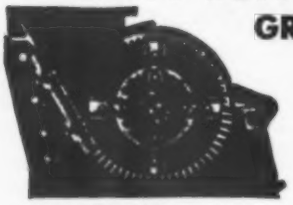
MARMON-HERRINGTON CO., Inc., INDIANAPOLIS 7, INDIANA
Cable Address: MARTON



The OWEN BUCKET Co.
Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, California

GRUENDLER CRAFTSMANSHIP
Employed by U.S.A. in the WAR EFFORT

HEAVY DUTY CRUSHING and GRINDING EQUIPMENT
for—Heavy Ores, Chemicals, Bauxite and ROCK Products



Gruendler Features:
MOVING TRACK BREAKER PLATES
For Wet, Sticky Materials.
TRAMP METAL CATCHER
Full Protection to Crusher.

Developed by Engineers who have made a Life Study of the Hammer Mill Principle for Material Reduction keeping in step with new features to meet the demands for greater efficiency and speed.

Write for our Bulletin on Large Capacity Hammermills

GRUENDLER
ST. LOUIS, U.S.A.
GRUENDLER
GRUENDLER CRUSHER & PULVERIZER CO.
PLANT and MAIN OFFICE—2915-17 N. MARKET • ST. LOUIS, MO.

Until the Axis quits

....THE U. S. NAVY NEEDS BYERS CRANES WORSE THAN WE DO AT HOME...AND THE NAVY IS GETTING THEM

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

WHEN THE WAR IS WON
Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

BYERS CRANES AND SHOVELS
LAVENIA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

Tanks move doggedly forward wreaking havoc on the enemy but their speed is necessarily slower than trucks and their span of continuous service considerably more limited.

So they crawl up on Rogers Trailers and are moved quickly to the line of combat—or from it when repairs or reconditioning becomes necessary.

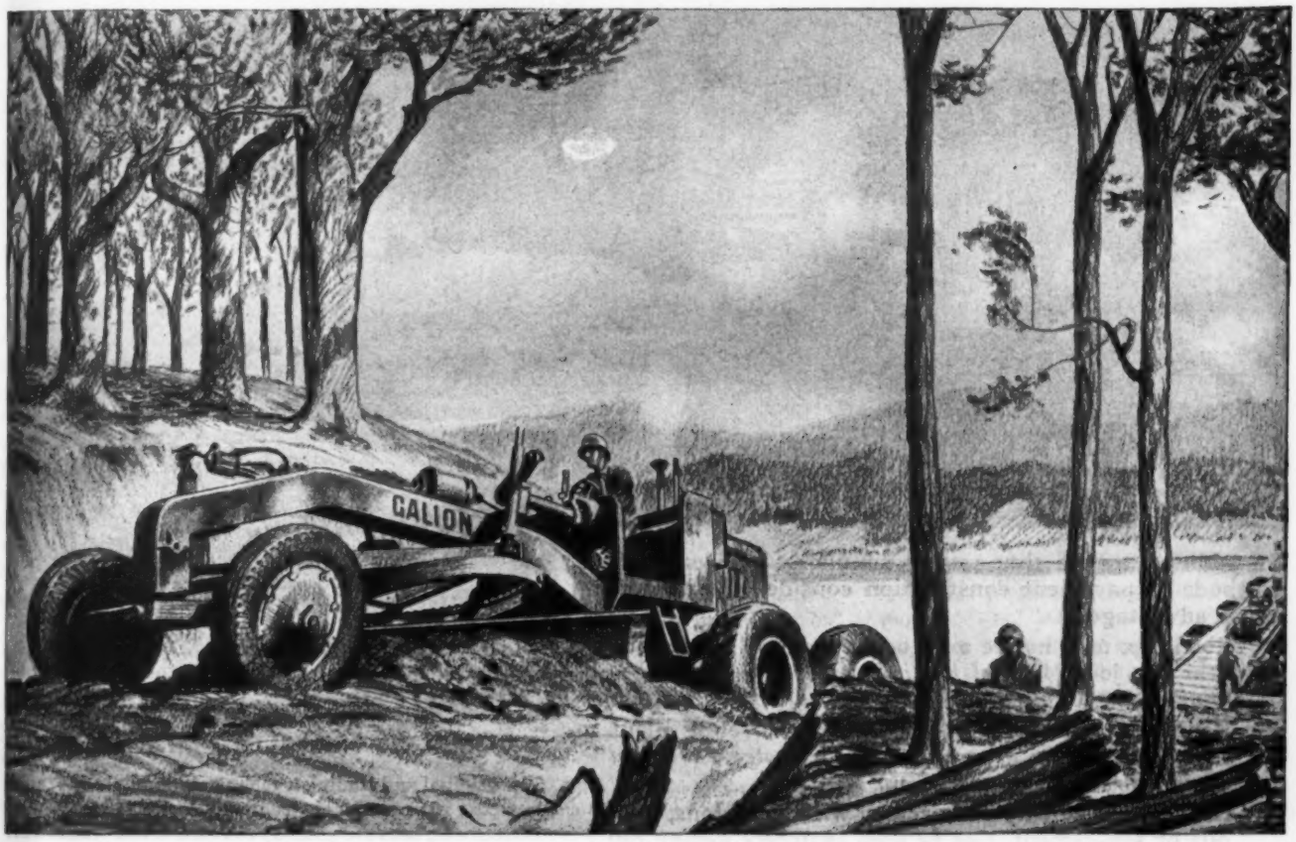
Thus, the effectiveness of an important combat unit is increased manifoldly by these non-combat vehicles.

ROGERS BROTHERS CORP., ALBION, PENNA.

ESSENTIAL TO MODERN MECHANIZED WAR

ENGINEER CORPS—GALION GRADERS AND ROLLERS

Transportation of men, supplies and machines is essential. The work of the Engineer Corps is very important and the tools with which they must work must be rugged and dependable. This outfit builds the temporary and perma-



nent bridges, roads, railroads . . . constructs air bases and landing fields. Roads to be built and maintained on every project with Galion graders and rollers an essential part of the equipment. Yes, the United States Engineer Corps plays an important part in modern, mechanized warfare. And so does Galion.

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

Compare YOUR PRESENT METHODS OF PAVEMENT CONSTRUCTION WITH THIS SIMPLE *ROAD-MIX* FORMULA

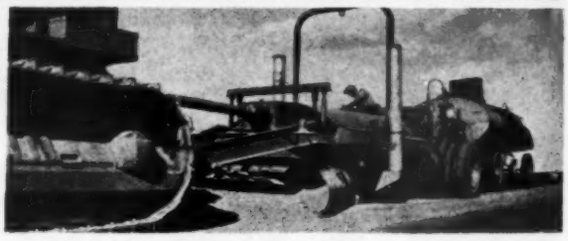
1. *Grade the road or airport to proper elevation.*
2. *Windrow the material into equalized windrows—or determine width of panels to be mixed if windrowing is not necessary.*
3. *Mix the windrowed material with a Wood Roadmixer, using cold asphalt or other binder.*
4. *Spread and compact the mixed material.*

Placing caliche base, with Wood Roadmixers on mid-western airport

In addition to the time-saving simplicity of Road-mix methods of pavement construction consider these additional advantages.

- Road-mix uses native and local materials lying at or near the job. *Material hauling costs are reduced to a minimum.*
- Road-mix uses the mix-in-place or traveling plant method of mixing. *Central plant is eliminated. Labor and equipment are saved.*
- Road-mix is equally satisfactory with emulsions, road oils or soil-cement. *Can be used anywhere paving can be laid.*
- Road-mix equals or excels in quality and long life pavement constructed by any other method and *costs much less.*

These are reasons why an ever-increasing number of paving jobs are being done by Road-mix—reasons why *you* can profitably *design for Road-mix.*



WOOD ROADMIXER

A COMPLETE TRAVELING MIXING PLANT

The original and leading traveling plant method of rapid, low-cost pavement construction. Requires less capital investment, because you buy *only the Wood Roadmixer.* Requires less equipment, because tractor and binder supply truck, standard equipment with every contractor, *are only additional equipment needed.* Requires less manpower, because *two men* can handle the entire unit. Delivers highest production, because actual records of jobs under construction today show production in excess of *250 tons per 8-hour day*... Records prove that Wood Roadmixer will deliver better paving faster and for less money than any other proven mix-in-place method. With proper priority and WPB release we can ship you a Wood Roadmixer today. Write or wire for literature and costs.

➡ ➡ ➡ DESIGN FOR ROAD-MIX

Write for detailed and illustrated Wood Roadmixer bulletin, "The Fastest Method of Low-Cost Paving."

WOOD ROADMIXER

ROADS AND STREETS

August, 1943, Vol. 86, No. 8

Maintaining 750 Miles of Streets and Alleys

Notes on Cincinnati's Wartime Street Program

By C. E. BROKAW
Superintendent Highway Maintenance Division, Cincinnati, Ohio

THE advent of war finds Cincinnati with a large continuing problem of street maintenance. As a result of the lack of sufficient street improvement, many more miles of old pavements are being maintained than is consistent with the best maintenance practice. However, voters who in recent years have been apathetic toward bond proposals for needed street improvements, are now keenly conscious of the vital role of safe, efficient streets in the local war effort.

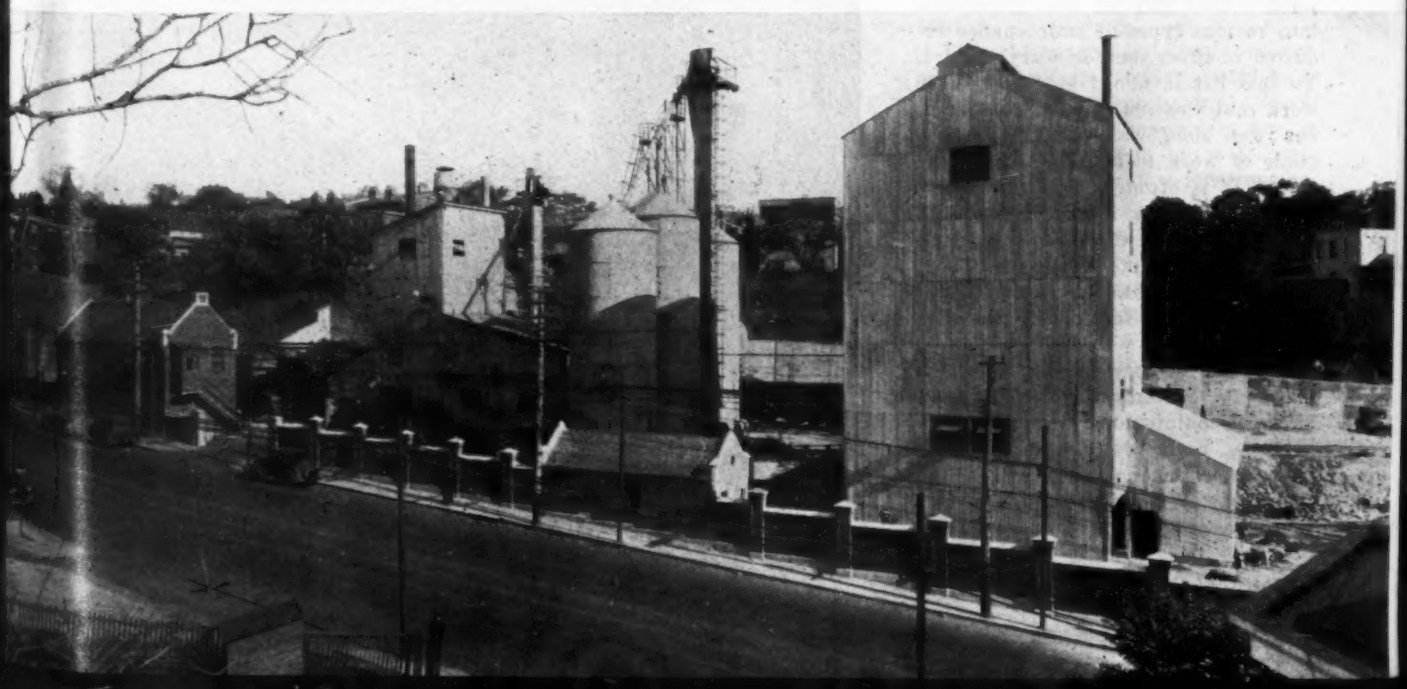
While over all traffic volume is estimated at approximately 10 per cent less than in 1941, heavy trucking necessary to support Cincinnati's billion-dollar-a-year machine tool and other war manufacturing industry, places an additional burden on a large part of the entire street system.

Meeting Wartime Personnel Problems

Cincinnati's Highway Maintenance Division normally employs about 575 people. The largest unit in the Department of Public Works, its functions include repair of all dedicated streets; inspection and restoration of all pavement cuts; street cleaning, flushing and removal of ice and snow; sewer maintenance, cleaning, and minor construction; bridge and viaduct maintenance; construction and maintenance of loading platforms, steps, walks, guard fence, railings, etc.; installation of traffic signs and other traffic regulatory devices; and (until recently) supervision of Works Program Administration street, sewer and alley projects.

These functions are listed to underscore the vital importance of this department in a war-production center, and the seriousness of our personnel problem. Employes dropped from 574 in 1941 to 541 in the early part of 1942. By the fall of 1942 employes were being separated from the service so rapidly that emergency employment measures had to be taken to maintain a force sufficient to op-

Cincinnati's modern asphalt plant, where 37,000 tons of hot and cold materials were produced in 1942



One of the city's surface heaters. Material removed from track zones during treatment is spread over worn streets and alleys in the immediate neighborhood

erate. From that time to date approximately 200 wholely untrained laborers were hired on a temporary war-emergency basis. We now have an organization only as large as in the spring of 1942, indicating the rapid turnover of employes.

In the office, a difficult in-service training program for new employes has been accompanied by reassignment of responsibilities in an effort to carry on with the few remaining experienced employes.

However, in spite of shortages, our Highway Maintenance Division has been successful in securing adequate labor and materials for a rather curtailed program of carefully selected street maintenance and repair projects this year.

Compiling the Annual Maintenance Program

During the early spring of the year our practice is for certain members of the Division to make a careful field investigation of the condition of all types of street pavement in the city. A complete list of all pavement types in need of major maintenance is compiled. This list is then separated into various types of maintenance required to effect the necessary repairs. To this list is added any carry-over work that was not finished the previous year, along with specific promises made of work to be done during the year. It is often necessary to postpone major work in connection with complaints, until the following year's work program is prepared. These cases of course are also considered and included, if feasible, in the current program.

As near as possible, an effort is made to concentrate the different kinds of maintenance work in a few localities each year, rather than to have the work spread over the entire city. With this in mind, each time the program is prepared, it is possible to effect a considerable saving in cost, resulting in an increased yardage of maintenance accomplished to the benefit of the street system.

After the individual programs are prepared, yardage, quantities of material, and other pertinent data are extended and totaled. The entire program is then considered from the standpoint of finances, which at that time of the year are fairly well known. The lists are then checked with maintenance records to determine when and how much major maintenance was afforded each street being considered. Those most recently repaired and not as urgently in need of maintenance, are deleted until the program is pruned down to a possible working maximum. A record is made of the work which is thereby eliminated, to be used in the coming year, the same in the current year, as a basis for next year.

800,000 sq. yd. Surface Treatment Program

The surface treatment of bituminous pavements will about equal the 1942 program of 847,000 sq. yd. So called major macadam repairs will be considerably reduced, as the general procedure for this year will be to reduce, as much as feasible, the amount of repairing in advance of surface treatment. No general resurfacing is planned, and some of materials, that normally would be used in this operation, will be employed in surface treatment in an effort to get maximum yardage of preventive maintenance and yet cooperate with the war effort.

The largest part of the surface treatment work will be accomplished using quick-breaking emulsified asphalt with a so-called coarse cover material which is 100 per cent passing ½-in. sieve. The balance of the work will be completed using tar and asphalt cut-backs. The tar will be used for initial treatment of sheet asphalt and concrete surfaces.

Track Area Maintenance

Track zone maintenance is a major problem in Cincinnati because of the large mileage of older concrete, brick and granite block pavements. About 200,000 sq. yd. of track area surface was waterproofed in 1942, and a slightly reduced program is under way this year. The operation is accomplished every year, in late summer or fall, by applying an emulsified or cut-back asphalt by hand, and squeegeeing the material into all cracks. A cover of pre-treated mineral aggregate is then applied.

The treated sand is prepared by using a bituminous sand equal to the sand described in Section M 2.2 of the State of Ohio Construction and Material Specifications. The sand is blended in a pugmill mixer at the Municipal Asphalt Plant, using a small amount of liquifier and 80 to

Cincinnati treats about 200,000 sq. yd. of track zone pavement annually

Scenes in the Cincinnati sign shop (see text for facilities)

100 penetration grade asphalt. Forty pounds of asphalt, 6 quarts of liquifier and 1,960 lb. of sand produce a ton of finished material. The sand, so coated, eliminates dust, adheres readily to the treatment, packs well without adding excess bitumen to the sealed street, generally yielding a more durable treatment. The cost of pretreating the sand is entirely justified in view of the almost complete elimination of dust complaints.

Surface Heaters—Great Labor Savers

The heater method is used to repair deteriorated asphaltic surfaces where the condition is such that it will not respond to regular surface treatment. Two surface heaters which were assembled in the Municipal shops, are used for this work.

Heating is accomplished by an oil burner arrangement operated by an air-cooled motor power blower, which is mounted on a rebuilt dump truck chassis. The heater hood is raised and lowered by a hydraulic ram. Remarkable fuel economy is attained by this unit, which operates on approximately 75 gal. of oil per 8-hr. day. Heating for the removal of ½-in. depth of sheet asphalt, requires 3 to 5 minutes. The heating of the various stone mixes is accomplished in 5 to 7 minutes. Between 250 and 300 sq. yd. of pavement surface is burned off in a day.

Accepted practice is followed, in that the old surface is heated to about 1,000° F. (temperature under the hood). The top ½ to ¾-in. of heated material is raked off and the area then opened to traffic. The burned off surface does not require barricading, as the depth of this treatment is so shallow that little difficulty is experienced by traffic. Asphalt repair crews follow a week to 10 days behind the burn off operations. This delay in final restoration is so arranged to provide greater efficiency by handling the repair in two operations rather than one, since different equipment and different classes of labor are used.

A concrete products shop manufactures precast steps, curbs, and other units involved in street repairs and municipal service

The material which is removed by the burner method is salvaged by spreading on nearby unimproved roadways while still warm. A list of unimproved thoroughfares in need of maintenance is compiled each year to coincide with the surface heater program, so as to hold the distance of hauling to a minimum. The material, when spread on the so-called low grade unimproved roadways, is just raked to grade and allowed to cool without being rolled. Sections of approximately 40 streets and alleys were considerably improved by this method in 1942.

The Municipal Asphalt and Crusher Plants

The Municipal Asphalt Plant is in reality 2 asphalt plants, one with a capacity of 20 tons per hour of hot or cold mix and another with a capacity of 40 to 50 tons per hour of hot mix and 60 tons per hour of cold mix.

The hot bituminous mixes produced are: sheet asphalt, asphaltic concrete T 50 and asphaltic binder; Ohio State Specifications. The temperature range at the plant is between 275° F. and 320° F.

The cold mixes are bituminous concrete and mastic cushion (used as a bed for brick or block paving). Specifications covering these mixes are in accordance with Ohio State Department of Highways Specifications issued March 1939.

We also use these plants to considerable advantage in the treating of aggregate for use in hand squeegee and surface treatment work.

The following is a display of quantities and costs of the major items of manufacture for the year 1942:

	Tons	Per ton
Asphaltic Concrete (cold)..	25,000	$3.43
Asphaltic Concrete (hot)...	11,000	3.90
Sheet Asphalt	1,500	5.23

The Municipal Crusher Plant has a capacity of 100 cubic yards of

Power equipment is used to the limit in collecting and clearing leaves. The entire street maintenance force drops normal work and concentrates on this task every Autumn

crushed material daily. It is entirely complete and modern being equipped with the necessary elevators, screens, and dust control system. Adequate storage facilities make it possible to run this plant to a fixed program designed to maintain an ample supply of various sized aggregate at all times.

The greater portion of our aggregate requirement is contracted on a basis requiring delivery to any location within the corporate limits of the city. No quarrying is done as the crusher plant is operated using salvaged stone almost entirely. Old brick, granite, concrete, sheet asphalt and other asphaltic type surfaces are salvaged from all streets that are to be improved, and then hauled to the crushing plant and stock piled. Later this material is crushed and used advantageously for street repair.

Approximately 13,500 tons of crushed material was produced in 1942 at an average cost of $.70 per ton.

Two Valuable Shops Operated by the Highway Maintenance Division

This Division operates a modern Sign Shop, which is equipped with arrangements for dipping sign blanks, two electrically operated baking ovens and a road sign coating machine, which is used to repaint the lettering on embossed traffic signs. A regular silk screen stencil set-up is included, making it possible for the city to manufacture all metal signs, with the exception of those that are purchased originally embossed. The shop is also equipped with a steam-heated lye tank arrangement for stripping the paint from old shabby looking signs so that they can be reprocessed. Equipment is also available in the general shop for straightening any of the metal blanks after stripping, so that they may be properly handled in the paint shop.

This Division also operates a precast concrete shop to manufacture such necessary items of maintenance as precast concrete steps, precast concrete curb, precast center line markers, precast reflective curb, precast mushroom markers, precast bases on all sign post angles and many other small items of manufacture such as replacement of ornamental ballustrades used in the maintenance of structures.

An Efficient Method of Leaf Removal

A satisfactory method of leaf removal has been inaugurated. The entire operation is handled by street cleaning forces, who, when conditions indicate that a sufficient quantity of leaves are down on the street to make the operation worth while, suspend altogether their regular street cleaning operations in residential sections and function 100 per cent on leaf removal. Leaves are removed between curbs only on improved streets. The leaves on the street to be cleaned are first flushed back by a street flusher. This operation succeeds in concentrating the leaves in the gutter area, and also wets them down so that they can be easily handled. The leaves are then pushed up into piles, by a small pneumatic tired tractor equipped with a pusher blade. In some cases, street sweepers equipped with a leaf pushing type broom are used. The leaves are then hand loaded and removed to a dump. Arrangements are usually made with the Park Board and Recreation Commission of the city to provide suitable dumps on their property, so that the leaves removed from the streets can be used by these departments for fertilizer. In many parts of the city, however, it is not convenient to do this, and at these locations the leaves are removed either to a city dump where street sweepings are normally deposited, or in some cases delivered to private citizens who request the leaves for agricultural purposes. In all cases, however, the decision as to where the leaves shall be hauled is controlled by limiting the delivery to the point nearest the operation.

Night Operation Held to a Minimum

Maintenance operations in Cincinnati are conducted mainly in the day time. Mechanical street cleaning operations are conducted entirely during the night time, in the so-called congested districts. However, power sweepers and flushers are operated in residential neighborhoods in the day time. All major repair work to be accomplished in the congested part of the city is planned in the beginning of the year, as a night program, which usually extends for a 30 day period some time in September or October.

Other Upkeep Planned

Certain other maintenance operations are continuing on a minimum basis. Somewhat less than the normal 2,500,000 linear feet per year of pavement joint and crack filling is planned for 1943. Mudjacking usually carried out on a 30,000 to 35,000 sq. yd. basis annually will be employed only as an emergency measure this year. In 1942 about 35 miles of rail totaling 2,600 tons was removed from abandoned car lines, a WPA project. However, no rail salvage is planned this year.

Generally speaking Cincinnati is in a favorable position to continue an

adequate program of street maintenance.

The conversion of many of our hand operations to partly or wholly mechanical operations has in the past made possible very satisfactory costs. The several plant installations of course are vitally important in maintaining low costs. The long range planning necessary to provide adequate equipment for a highly mechanized organization has paid considerable dividends. This fact alone is largely responsible for the lesser disturbance to our organization than would have been experienced were we dependent entirely on presently scarce, high cost labor.

C. O. Sherrill is City Manager of Cincinnati.

Home-made outfit for steam-cleaning safety islands

Steam Cleaning of Safety Islands

Among Cincinnati's most valuable pieces of labor saving equipment is a special outfit for steam cleaning safety islands, guard posts, and car loading platforms. This unit is also used on occasions for steam cleaning in the shop. It consists of a Clarkson fuel-oil-burning vapor carheating unit mounted on a special water and solution tank for washing down and rinsing platform surfaces. Through adjustable valves a gasoline pump forces water, solution or any mixture of the two.

Officials of New North Dakota Board of Engineers Registration

Jay W. Bliss, city manager at Minot, has been elected chairman of the state board of registration for professional engineers in North Dakota. Dr. Alex C. Burr, dean of Jamestown college and a consulting engineer, has been elected vice chairman and Clifford Johnson, bridge engineer of the State Highway Department, secretary of the three-man board created by the 1943 legislature.

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Florida Keys Road to Be Ready This Winter

Florida's greatest road-building project, which has been compared with the Alaskan highway because of the many engineering difficulties involved, is over one-third finished and its final completion date is slated as December 1.

It is the 123-mile "Overseas Highway" from Florida City to Key West, the United States' Gibraltar of the Caribbean."

This 22-foot roadway originates at the tip of the Florida Peninsula and winds southwesterly into Caribbean, crossing 32 small islands of the Florida Keys which are linked together by bridges ranging from a fraction of a mile in length to one nearly 10 miles long.

Built at the specific request of Army and Navy officials, the project is being jointly financed by the state and Federal governments.

The highway is being constructed over the right-of-way of the abandoned Florida East Coast Railroad, a $25,000,000 dream of the late railroad king, Henry M. Flagler. This railroad was completed in 1912 after nearly eight years' work.

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E. S. Gillette Elected Director ARBA

The Executive Board of the American Road Builders' Association has elected Edward S. Gillette, Publisher of ROADS AND STREETS, a director of the Association to fill the unexpired term of Victor J. Brown. Mr. Brown, Publishing Director of ROADS AND STREETS, is now on leave of absence, serving in the Air Corps with the rank of Lieutenant Colonel.

E. S. Gillette

Mr. Gillette was graduated in 1921 from the Towne Scientific School of the University of Pennsylvania with the degree of B. S. in C. E. Prior to his connection with the Gillette Publishing Co., he was connected with the Engineering and Surveying Corps of the Merchant Shipbuilding Co. and later assistant to manager of the Water Works Co. of South Bellingham, Washington. In 1928 he became Vice-President and general manager of the Gillette Publishing Company. In addition to ROADS AND STREETS, he also is publisher of WATER WORKS AND SEWERAGE, CAMINOS Y CALLES, POWERS' ROAD AND STREET CATALOG, and numerous technical books.

▼

Edgar Nelson Appointed to Dickinson County, Michigan

Edgar Nelson, employe of the Dickinson County Road Commission for the past 17 years, has been appointed by the commission as its Engineer-Manager. He succeeds M. C. Connolly, who resigned because of ill health.

William Johnson was chosen as Assistant Engineer.

Mudjacking operations are being doubled in California this year. Silt or loam, with addition of 4 to 6 sacks of cement per cu. yd., is used

California Steps Up Mudjacking

Methods and costs of program to save overloaded pavements by correcting pumping joints

By T. H. DENNIS
Maintenance Engineer, California Division of Highways, Sacramento

THE California Division of Highways has under way a mudjacking program which will retard if not prevent the progressive failure of some of our portland cement concrete pavements. The several crews now engaged in this type of work will soon be doubled and it is expected that all critical areas will receive treatment before rainy weather. The failures are due to a loss of slab support which is pumped out through the pavement joints under the action of heavy and repeated loadings when the subgrade is saturated.

Initial evidence of the loss of support is revealed by surface discolorations where the material is pumped through the joints. This is followed progressively by the settlement of the forward edge of the joint in the direction of traffic, and ensuing slab fractures at varying distances from the joint.

[Readers of this article will be interested in comparing details with the North Carolina methods (see pages 43-44), which are practically the same as those being used in South Carolina, Missouri and possibly other states. The methods are explained in Wartime Road Problems Bulletin No. 4, Highway Research Board, Washington, D. C. See also the Ohio practice of using pure asphaltic cement reported by H. D. Metcalf, in Roads and Streets, May, 1943, pages 53-54. —Editors.]

Slabs Not Raised

The mudjacking operation as now performed contemplates only the restoration of the slab support, and consequently the mud pressure is immediately discontinued at the first sign of slab movement. This procedure stems from our past experience in mudjacking which demonstrated the economy of bituminous mixtures for correcting large-scale settlements.

The effectiveness of the treatment naturally depends on the elimination of the entrapped moisture and its future exclusion. When this cannot be accomplished either through a combination of mudjacking and shoulder drains, or mudjacking and a light bituminous blanket course, then a heavy macadam cushion course and bituminous blanket should be employed.

The practice of fracturing the pavement and embedding the slabs into the subgrade, followed by the placing of a bituminous cover course is not recommended, as the slabs will continue to rock under heavy loading and thus destroy the cover course. Whenever fracturing is resorted to, a heavy macadam cushion course should be placed between the slabs and the surface blanket.

Ames Dials Check Deflection

In order to determine the immediate effectiveness of our mudjacking operations, two Ames dials mounted on platforms supplied by our Testing and Research Department were used to record the pavement deflections before and after treatment. The dials were suspended from cantilever arms extending from platforms resting on the earth shoulder adjacent to the pavement. Fifty lb. weights were placed on the platforms to insur rigidity. Each platform was supported on three small metal cylindrical blocks, one of which could be raised or lowered with a thumb screw. This adjustment was used to set the dials at zero for ease in reading the deflections.

All tests were made in the cool of the morning hours, so that the slabs would be free acting. The load, a 500 gal. tank truck filled with water and weighing 9400 lb. on the rear axle, was placed so that the rear wheels would clear the deflection apparatus by about six inches.

Holes of 2¼ or 1½ in. diameter are drilled for mudjacking. Complete mudjacking costs per hole averages $1.87

Readings were then taken on both dials with (1) the rear wheels of the truck about 8 inches back of the transverse joint; (2) the rear wheel directly over the joint and (3) the rear wheels 8 inches ahead of the transverse joint. The recordings in Table I indicate the result of several of our first tests.

The readings were taken during our early operations on a 3-lane pavement where the displacement was confined entirely to the two outer 10-ft. lanes. Holes were drilled directly through the transverse joint in each 30-ft. panel of the outer lanes, at from two to three feet in from the lane edges. No holes were drilled either in the panels of the center lane or along the longitudinal joints separating it from the outer lanes. Some 704 holes 2¼ x 7-in. were required per mile. An analysis of the costs, crew and equipment follows:

Estimated Cost of Mudjacking Per Mile

Three-lane panel length 30 ft., two outer lanes only mudjacked.

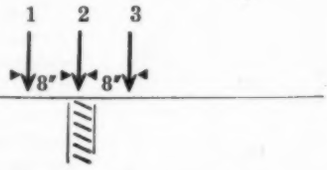
Drilling 300 holes per day with 2 hammers—210 c.f. compressor. (1 mi. in 2.33 days.)

Mudjacking 1,320 lane-ft. or 660

TABLE I—JOINT DEFLECTIONS MEASURED WITH AMES DIALS

Position 1 2 3

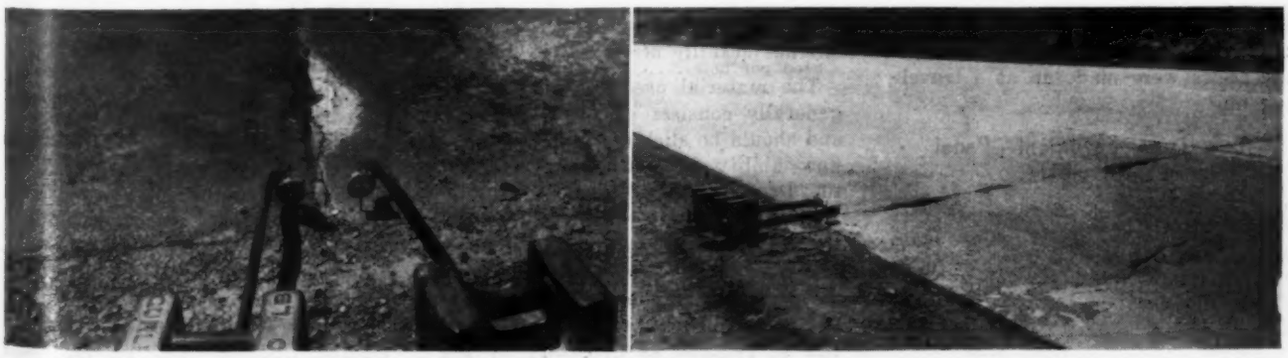
Rear Axle Load 9,400 lbs.



Longit. elevation at transverse joint

Position Rear Axle	Date	Before Mudjacking Lt. Dial Reading Inches	Before Mudjacking Rt. Dial Reading Inches	After Mudjacking Lt. Dial Reading Inches	After Mudjacking Rt. Dial Reading Inches	Date
Pavement Joint No. 18						
1	5-26-43	.027	.018	.014	.004	5-27-43
2	5-26-43	.028	.038	.014	.007	5-27-43
3	5-26-43	.015	.063	.005	.022	5-27-43
*Recovery	5-26-43	.005	.007	.003	.006	5-27-43
Pavement Joint No. 14						
1	5-26-43	.043	.026	.020	.006	5-27-43
2	5-26-43	.042	.051	.014	.016	5-27-43
3	5-26-43	.024	.068	.008	.018	5-27-43
*Recovery	5-26-43	.005	.008	.003	.004	5-27-43
Pavement Joint No. 6A						
1	5-26-43	.018	.002	.007	.000	5-28-43
2	5-26-43	.018	.014	.007	.003	5-28-43
3	5-26-43	.008	.036	.003	.008	5-28-43
*Recovery	5-26-43	.002	.002	...	...	

*"Recovery" indicates dial reading after load was removed. Dial did not return to zero.



Ames dials set up for measuring deflections at joint

Dirt screening and loading mechanism as constructed and attached by Califronia Shop 7 to mudjack machine. Holes in revolving screen are ½-in. diameter. (At right) Sign that mudjacking is needed—mud stains from pumping joints

road-ft. per day, or 1 mi. in 8 days.

Cement (at 0.05 c.y. muck per hole = 35.2 c.y. per mi. = 8.8 c.y. per day) @ 5⅓ sacks per c.y. = 47 sacks per day or 188 sacks per mile.

A similar operation in another district where the same hole pattern was employed on a 2-lane pavement produced the following costs. In this particular instance the holes drilled were 1½ x 7 in. You will note that in both cases the costs include subsistence as the crews were made up as a traveling unit:

Two Lane Pavement—Panel Length 20 Ft.

1. Labor		$1,655.80
2. Equipment (State)		328.15
(Rented)		195.00
3. Materials and Supplies		271.45
Cement	$144.77	
Cellite	20.85	
Gas and oil	60.00	
Bits	4.43	
Dist. Warehouse	15.00	
Valves	12.50	
Drill steel	13.90	
4. Service and expense		$242.73
Room	$61.75	
Meals	93.98	
Telephone	12.00	
Sharpen bits	35.00	
Miscl. repr. parts	40.00	
		$2,693.13

Days operated ....17 ($158.00 per day)
Muck used. 42.6 c.y. (2.5 c.y. per day)
Cement used .....183 sacks (4.3 sacks per c.y.)
Cellite used...1,350 lb. (31.8 lb. per c.y.)
Number of holes filled.....2,017
Average cost per hole, drilling only $0.36

Drilling Cost

Equipment, Supplies			
Compressor 2.33/22 mo. @ $95.00	$10.00		
Truck 2.33 day @ $3.80	8.90		
Jackhammer (2) 2x2.33/22 @ $13.00	2.80		
Pavement breaker (1) 2.33/22 @ $13.00	1.40		
Bits, sharpened 2.33 day @ $2.00	4.70		
Gas and oil 2.33 day @ $2.00	4.70	$32.50	
Labor			
H.E.O.L. (2) 2x2.33/22 mo. @ $195	41.20		
Flagman 2.33/22 mo. @ $165	17.50	$58.70	
12½% Vacation, sick leave		7.60	66.30
			$98.80

Mudjacking Cost

Equipment, Supplies				
Mudjack 8 days @ $9.00	$ 72.00			
1½-ton truck (water) 8 days @ $3.80	30.40			
1 dump truck (mat'l) 8 days @ $3.80	30.40			
Ford express 8 days @ $1.50	12.00			
Gas and oil 8 days @ $4.00	32.00			
Cement, 188 sacks @ $0.75	141.00		$317.80	
Labor				
Foreman 8/22 mo. @ $235	$ 85.40			
H.E.O.L. (3) 3x8/22 mo. @ $195	213.00			
Laborer (2) 2x8/22 mo. @ $165	120.00			
Flagman (1) 1x8/22 mo. @ $165	60.00	$478.40		
12½% Vacation, sick leave		79.00	$557.40	
Cost per mile				974.00
Expenses 2.5 man-months @ $135				338.00
Cost per mile (including living expenses)				$1,312.00
Cost of drilling per hole		$0.20		
Cost of mudjacking per hole (including drilling)		1.87		
Average cost per hole, drilled and filled		1.33		
Average quantity of material used per hole		$0.57 cu. ft.		

The material used for mudjacking generally consists of a silt or loam and should be slick enough to provide flow ability. A. M. Wintermyer in the December, 1933, issue of *Public Roads* describes in considerable detail the types of soils suitable for mudjacking. Soils with a volumetric shrinkage as high as 20 per cent are not disqualified since this shrinkage can be reduced as necessary by the addition of cement. Cement is added to the soil at rates varying from four to six sacks to the cubic yard of muck, the richer mix being employed where the subgrade is highly saturated.

The following grading analysis covers materials which have proven satisfactory in our work:

Sieve Size. % Passing	Soil A	B	C
No. 4	..	..	..
No. 8	100	..	..
No. 16	..	100	..
No. 30	..	..	..
No. 50	99	..	100
No. 100	98	90	58
No. 200	83	65	48
Wash No. 270	71	57	44
1 micron	7	3	not made
5 micron	20	9	not made

The present trend in heavy commercial traffic, which in 1942 increased some 30 per cent over the 1940 high, makes a mudjacking program imperative. Loads of 20 to 25 tons and over have risen from a ratio of 25 for each 1,000 trucks to 80 per 1,000. Axle loadings in excess of 22,000 lb. have likewise increased 50 per cent in the same period. Unless our pavements are adequately supported we can only expect their continued and rapid deterioration.

▼

Captain Loveland Appointed Area Engineer

Capt. Ford D. Loveland has been assigned as area engineer for Lowry Field, Buckley Field, Fitzsimons General Hospital, Fort Logan, Camp George West and the Denver Medical Depot.

Capt. Loveland was area engineer at Buckley Field first as a civilian employe until Sept. 10, 1942, on which date he was commissioned a Captain in the Army of the United States. On Nov. 3, 1942, Buckley Field was consolidated with the Lowry Field area office and Capt. Loveland became operations officer of the consolidated area office.

Before coming to Denver, Capt. Loveland was connected with the Omaha District Office on river and harbor work as a civilian employe.

Mudjacking in North Carolina

By B. W. DAVIS
State Maintenance Engineer, North Carolina
State Highway and Public Works Commission, Raleigh

WHILE the 1942-43 winter was not severe, the increase in heavy traffic has caused considerable roadbed damage. High-type roads that appeared to be adequate prior to 1942 are now "pumping" and as a consequence breaks in the pavements are more frequent.

The pumping action is taking place on new as well as old pavements. The condition is serious and will necessitate considerable expense. We are trying to correct this condition on lately constructed pavements by "mudjacking" through (and hence under) the pavement a slurry consisting of soil and clay, asphalt, cement and calcium chloride (see below). We are not yet able to judge the success of this process.

Following instructions have been issued governing this work:

Drill Holes Carefully Spotted

Drilling the holes at the proper location for an even distribution of the mud is important. The diagrams on the attached print are typical procedures for the spacing and location of holes. No set formula fits every case.

The drilling equipment should be controlled to eliminate heavy impacts, to avoid the danger of breaking off pieces of concrete from the lower side of the slab.

Spacing and location of holes depend upon the condition and dimensions of the slab. The mud, under pressure, will tend to flow in all directions about the same distance from the hole. Therefore, in general, the holes should lie in a circular pattern about each other.

If only one end of the slab is to be raised, holes in that part should be spaced as if the entire slab were to be drilled. In this way they fit into the regular pattern if further settlement later makes it necessary to drill and pump more of the slab. If two slabs are joined together with tie bars at the longitudinal joint, the center line holes should be drilled alternately on either side of the joint.

Pumping Procedure

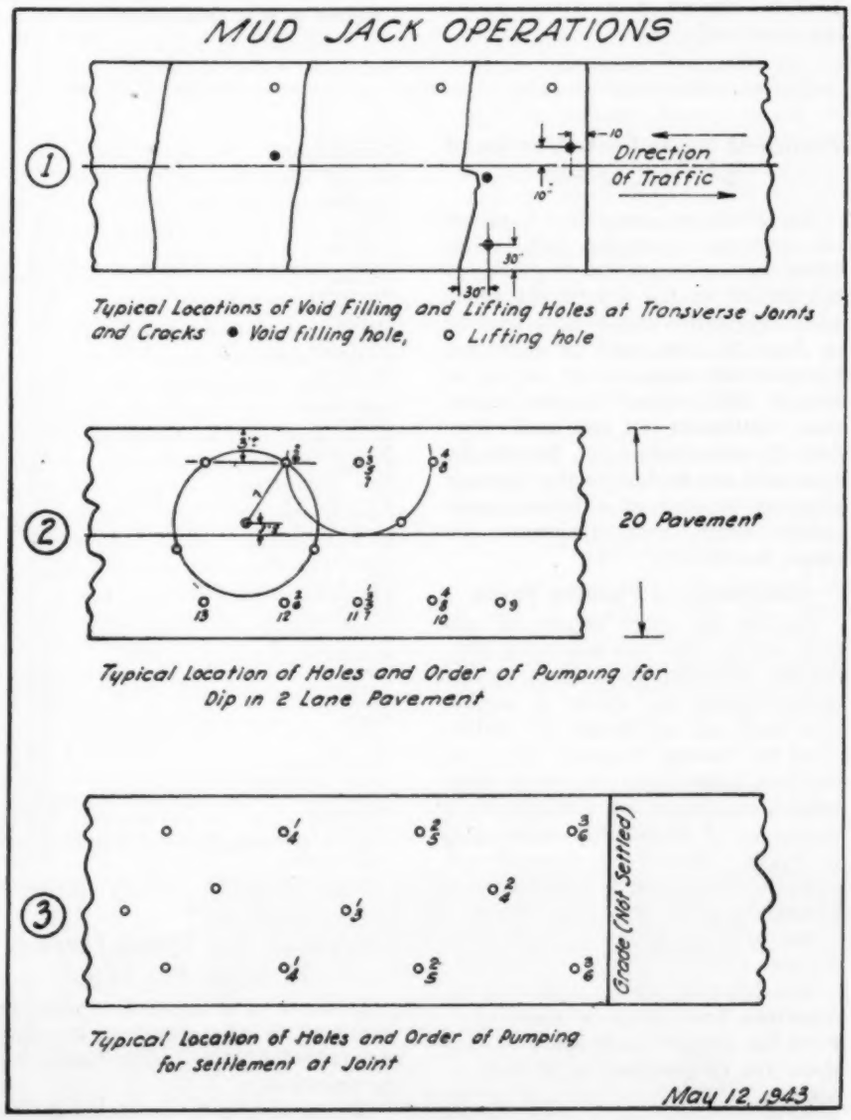
The sequence of pumping operations depends on a number of factors. One rule must be remembered, and that is that the sequence should be such, that the stresses which were set up in the slab as it settled are reduced and not intensified.

Soil used in the mix to be pumped under the pavement should be loose, loamy topsoil, silty loam, or a friable clay soil (that is a clay soil that will readily pulverize). The material should be comparatively free from sand.

(1). When the mix is used for preventing or correcting the "pumping action" of a pavement slab it should be thin—about the consistency of a thick buttermilk. Portland cement, plaster of paris, calcium chloride, and/or asphalt will be added to the mix in varying quantities, to meet the existing subgrade conditions. The mix used in summer weather unless another mix is specified, based on laboratory studies, will be:

74.5%	Soil
15.0%	RC-2A
10.0%	Portland Cement
0.5%	Calcium Chloride
100.0%	—Total.

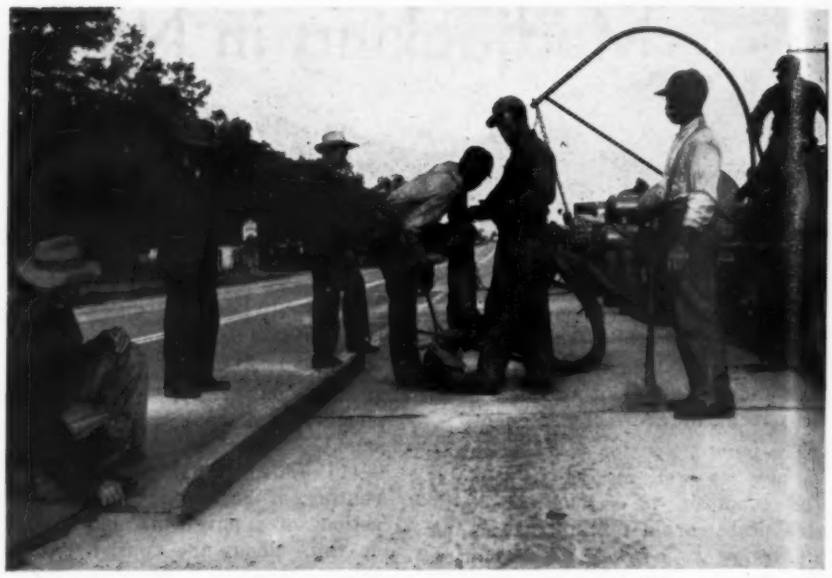
In preparing the mixture, part of the water and the soil should be mixed first, then the liquid asphalt added and, finally, the portland cement, calcium chloride, and such additional water as may be needed to obtain the proper consistency.



North Carolina's hole-drilling instructions

(2). When the mix is used to lift a depressed section of pavement it should be thicker than the mix referred to above and yet thin enough to flow under pressure. Under the sections of the slab where the settlement is tapering to no settlement the mud should be thinner than the mud used where the settlement is greatest. The "lifting" mix should have 5% to 10% portland cement to bring about a slight "setting" and to reduce the shrinkage of the mud.

W. Vance Baise is state highway engineer of North Carolina.



Showing North Carolina convicts operating mudjacking equipment on "void filling" work. The straight-edge is used as an eye aid to stop pumping before "lifting" of the pavement begins. Note air hose attached to the mud hose. Compressed air valve is first opened for a few seconds, then closed, and mud valve opened. When pavement shows the slightest sign of being lifted the mud valve is closed and the air valve is again opened to spread the mud. As the air spreads the mud the pavement settles slightly and then the mud valve is again opened so as to completely fill the void. The man holding the axe then drives a temporary wood plug in the 1½-in. hole

$9,000,000 of Road Contracts Let in Illinois

During the first six months of this year road contracts amounting to about $9,000,000 were awarded by the Illinois Division of Highways. About 41 miles of new pavement were placed under contract during this period.

[See ROADS AND STREETS, July, 1942, for account of the State's patching program.]

President Signs Post-War Road Bill (H.R. 2798)

The President, on July 13, signed the postwar planning bill (H.R. 2798), which prevents the loss of $68,000,000 of the federal-aid funds which normally would have expired on June 30, 1943; and an additional $103,000,000 which would expire on July 1, 1944, unless obligated before then. Although not law until after July 1, nevertheless the $68,000,000 fund will not be lost to the highway program because of a 60-day grace before which reapportionment becomes mandatory.

Distribution of Planning Funds

One of the more important sections of the new law sets up a $50,000,000 planning fund to be apportioned among the states in accordance with the provisions of Section 21 of the Federal Highway Act. Allocations under these provisions range from a minimum of $250,000 to a maximum of $3,252,287, which goes to Texas. New York, Pennsylvania and California each received over $2,000,000 while there are an additional 15 states in the million to two million bracket.

The following table, supplied by the American Road Builders' Association, gives the proportionate share of each state (to be matched by states).

Alabama	$ 1,073,685
Arizona	737,698
Arkansas	879,293
California	2,052,543
Colorado	920,452
Connecticut	318,057
Delaware	250,000
Florida	736,147
Georgia	1,287,986
Idaho	634,020
Illinois	2,020,185
Indiana	1,232,715
Iowa	1,275,186
Kansas	1,293,058
Kentucky	955,360
Louisiana	762,633
Maine	444,348
Maryland	415,242
Massachusetts	670,583
Michigan	1,556,139
Minnesota	1,380,023
Mississippi	919,522
Missouri	1,519,138
Montana	1,037,280
Nebraska	1,020,507
Nevada	654,359
New Hampshire	250,000
New Jersey	651,596
New Mexico	829,669
New York	2,469,884
North Carolina	1,235,019
North Dakota	765,365
Ohio	1,802,996
Oklahoma	1,162,017
Oregon	849,827
Pennsylvania	2,093,567
Rhode Island	250,000
South Carolina	6[illegible]1,473
South Dakota	804,186
Tennessee	1,086,546
Texas	3,252,287
Utah	576,142
Vermont	250,000
Virginia	936,400
Washington	807,890
West Virginia	563,183
Wisconsin	1,231,947
Wyoming	638,436
Hawaii	250,000
District of Columbia	250,000
Puerto Rico	253,006
Total	$50,000,000

Average Car Speed Exceeds 35 Miles Per Hour

Evidence of a tendency to exceed a speed of 35 miles per hour has been announced by the Public Roads Administration.

Recent checks in 11 states showed average speeds as high as 47 miles an hour. Speeds approximated the 35-mile limit only in Maine, Minnesota, North Carolina, and Oklahoma, with the exception that in Minnesota the average need of busses was 45 miles per hour.

Earlier this year and last fall, Public Roads Administration reported speed counts showing national averages of 37 miles an hour for passenger cars, 35 for trucks, and 37 for busses. The present national average can be determined accurately only when additional reports are received.

Concerned over the trend toward higher speeds, Public Roads Administration cited new research emphasizing the importance of the national 35-mile limit in conserving passenger car tires.

In 1½ million miles of tire travel on roads in Iowa, Kansas, Missouri, and Wyoming, pre-war passenger car quality tires used on concrete roads wear only about two-thirds as fast at 35 miles an hour as at 45 miles per hour, the investigation indicated. Tires that would wear out in 40,000 miles at 45 miles an hour would give nearly 60,000 miles of service at 35 miles an hour.

"Variations in car speed caused greater changes in the rate of tire wear in the normal operation of the test cars than braking, acceleration, type and condition of road surfaces, tire inflation pressure, or any of the other factors investigated," the investigators reported.

Shrunken Budgets Swarming Traffic Swollen Rivers

Marion County keeps some of its best men on tarring work, to save waste and stretch the materials allotment as far as possible

Wartime problems of an Indiana county and what a resourceful road supervisor is doing about them.

By ROBERT R. FISHER
Road Supervisor, Marion County, Indianapolis, Indiana

I DON'T know much about the problems of other counties, but here around Indianapolis the war has greatly multiplied our road maintenance needs. It is a common fallacy to think of access roads as being all arterial. In Marion County we estimate that *over 500 miles* of our 1,358 miles of county roads are definite access feeders to military establishments or war industry plants located outside of Indianapolis or on the fringe.

Helping to completely change the pre-war pattern of rural traffic flow are Fort Benjamin Harrison, Stout Field, Camp Atterbury, the enlarged Municipal Airport, two army air training centers, three aircraft engine plants, a huge brass works, a refinery with heavy truck haul-away, a plane factory, and two Naval ordnance plants. In springing to the fore as one of the great mid-western war manufacturing centers, Indianapolis has increased its population by 150,000. Its rural off-primary-road traffic has increased a probable 30 per cent—and the counties maintenance problems by any percentage you care to name.

Budget and Materials Headaches

The sources of the problems are several. The biggest is a $128,000 reduction in our budget, result of basing county gasoline tax allotments this year on origin of license fees. While thousands of new war worker families have come to Marion County to find jobs, most of them buy their license plates back home, and for this reason rural counties in Indiana are getting bigger gas tax apportionments at the expense of booming war-center counties where the funds are sorely needed.

I'll mention just one more problem, this being our bituminous materials allotment, which so far is only 270,000 gal. plus 5,500 tons of asphalt and tar patching. To maintain our 330 miles of low and intermediate type bituminous county roads we normally need 600,000 to 700,000 gal. or more annually. The reduced allotment, designed to cover 138 miles of selected road surfaces, looked worrisome enough last January when we made up our request for materials. Since then the severe winter and long wet spring have made it necessary to do a lot of additional top sealing. And then in May came the unprecedented flood which was the most severe we have had in 30 years, damaging many miles of road and setting us back still further both material and money-wise.

Tar Procedure

As a result we have mapped out a job of patching only the worst stretches. For this work, as in years past, we have made extensive use of tar. After patching holes and scarifying and re-rolling a few hill-tops

How Robert Fisher's men repaired one washed embankment after the flood. Left: Old bridge floor timbers were set to form a line of sheeting along the shoulder lines on either side, and anchored into the fill by timber braces and by cable fastened to buried deadman. Right: Shoulder topped out after filling with several hundred tons of old brick building wall material

What happens when sealing is delayed six weeks after patching, due to labor scarcity. Dirt pockets in the gravel are beginning points of trouble, accelerated in this case by tank and truck fleets on practice maneuvers

This freshly top-sealed road using RT-8, is part of a 500-mile network of Marion County secondary roads of definite war-access value in the Indianapolis area

and other "worst places," selected sections of road are being given a light application of clean, washed gravel, followed by a 0.3-gal. per square yard top sealing with RT-7 or RT-8 and then applying chips. Pit run gravel is not desirable here.

In using tar we continually stress to our men the fact that you *cannot properly seal with tar when there is dirt in the chips or gravel.* Dirt itself is a "seal"—a penetration barrier. And time after time when a spot begins to ravel, investigation shows that dirt balled up in the tar was an underlying cause.

To seal a road we follow the distributor with stone chips, which are either tail-gated from a backing truck, or spread with a push-type rubber-tired spreader box. Next day we get on with a 7-ton tandem roller. In a few days, after traffic has worked loose chips to the edge, a broom is used to bring the material back on the road to blot any bleeding areas that have appeared. Tar is spread 18 ft. wide as a rule, and no change in width is contemplated this year. RT-7 and RT-8 are being generally used for this sealing work.

One of our principles in getting the most out of tar is to see that our skilled men do the applying and sealing. Our assistant supervisor, Sam Hollingsworth, often personally checks over the progress of work, to see that there is little or no waste of tar or chips.

Immediate sealing following patching is one of our problems this year due to lack of men and trucks. If a road is not sealed soon after it has been patched, it will be necessary to do this whole job over again.

In past years we have used RT-3 and RT-4 and a few loads of grit to lay dust and bind the gravel. Repeating operation every three years is as cheap and effective a way as we know of developing serviceable black-top roads for our farmers.

This year all types of bituminous roads will have to be skimped so severely that Marion County is headed back to horse-and-buggy days if more funds and materials aren't forthcoming. Our 1944 budgets, now being made, will barely cover minimum requirements, making no allowance for floods or unusual weather damage.

Lightly traveled roads are being given some crushed rock or pit-run gravel to hold them. Several miles of heavily traveled roads have reverted back to a traffic-bound condition. One such road serves a refinery which carries a hundred or more 25-ton gasoline loads daily, some with 50-ton army airport supply trailers.

Weeds are another wartime problem. Farmers are right in thinking that uncut weeds spread seed into their fields. We have four mowers out on days we can't black top. We are often tempted to ask farmers who complain to mow their own weeds this one year.

$239,000 Flood Damage

The May floods that hit the middlewest didn't skip the White River, which bisects Marion County. For days a valley width of many miles was inundated behind broken levees, leaving 6 wrecked bridges, 17 washed-out roads and washing 10,000 cu. yd. of gravel off the roads. Ten miles of black top was damaged and many times that mileage of berm was severely eroded.

Following is the estimated flood damage:

Bridges	$ 80,000
Gravel	20,000
Rip-Rap	20,000
Dirt Fill	4,000
Labor	15,000
Black Top	100,000
	$237,000

Such a flood would be bad enough experience any time, but this year the flood caught us short-handed and absolutely without funds for repairing the damage or for hiring emergency help to cooperate with distressed citizens. I have only the highest praise for our supervisors, patrolmen and the rest of our re-

"Before and after" repairing flooded Banta Road near Indianapolis. The fill consists of brickbats, given the county from old industrial buildings in the absence of emergency funds.

Many miles of Marion County bituminous macadam surfaces are being ground down to a "traffic bound" condition by heavy war traffic. A fleet of gas trucks like the one shown spelled a rough-finish for this road

Sign of the times—new operator breaking in on a grader (Marion County, Indiana)

(At right): Robert Fisher and assistant supervisor Sam Hollingsworth of Marion County, and W. F. Nixon of Reilly Tar & Chemical Co., in front of a truck hoist designed and built in the County shop (the frame came from an old motor grader). At the base of the "A" on either side are clevis eyes to facilitate dragging heavy objects laterally onto the road before picking them up.

duced county staff of 104 people. Some of the men didn't lie down to rest for 36 to 48 hours. One man got home at 2:30 a. m. the first night, only to be called out again in 15 minutes to help move families from bottom-land homes.

Borrow and Salvage

The city and county borrowed each other's equipment, and being without funds we had to scratch for materials. For example, 9,000 cu. yd. of wall brickbats was obtained from an old roundhouse and an abandoned foundry. It serves today as rip-rap along several thousand feet of valley roads, now restored to service. This rip-rap saved the county a $20,000 material bill.

After the flood the sacks were salvaged, and the sand used on tar sealing work

As a further economy, fertilizer sacks and cement sacks—even paper cement sacks—4,000 in all, were made up into sand bags which after the flood were carefully retrieved, washed and dried out. Most of the sand was salvaged. Some is being used in our top sealing work. The rest will be stockpiled for sanding next winter.

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George E. Baker Resigns

George E. Baker has resigned as city engineer and public service director of Long Beach, California.

American Society of C. E. Adopts Post-War Committee Report

Foreseeing the vital part that *planning-now* will play in safeguarding the national economy in the critical transition period after the war, the American Society of Civil Engineers Board of Direction on July 29 adopted a far looking report of the Society's Committee on Post-War construction.

This report, which is reviewed herein and will be published verbatim in September *Civil Engineering*, embodies a program of action on both private and public construction projects. The Society, which has 19,000 members, has offered the aid of its Local Sections and its membership in interpreting this program to the public and to private agencies to stimulate action. In presenting this report, the committee reminded that patriotism encompasses adequate planning for peace and that any shorter sighted attitude betrays those who have made great personal sacrifices to aid the war. This attitude must go beyond wishful thinking; it's past time to roll up sleeves.

Construction Industry Personnel Now Available

With completion of most of the war construction, the committee foresees that a large number of above military-age engineers, contractors and architects will be available for useful work in preparing surveys, plans and specifications for post-war projects. Their specialized talents will often be far better utilized by such employment than by efforts to fit into war production. This group is best fitted to carry out construction projects with the efficiency inherent under the contract system.

The committee outlines the many types of construction that will be needed. Prompt re-conversion of industry to peace will require new industrial plants, food storages, stockyard and packing-house facilities, mining structures, immense improvements in the railroad, petroleum, utility and other industries. Civilian airports loom importantly and vast housing and home construction must be anticipated.

Public works, which will probably comprise one-third of all post-war construction, involves many immediate planning tasks, in order to replace obsolete or worn-out facilities. Should absorption of returned soldiers into civil life take two years, as many foresee, the construction of new needed public works will help take up the employment slack and avoid wasteful tax-consuming "made work."

Long-Range vs. Short Range Planning

The committee compared the two opposing viewpoints commonly held. Long-range planning of super-highways, air terminals and other far-reaching projects is encouraged where such projects are sound. But an enormous volume of short-range projects for immediate use have piled up. A post-war program which is concerned primarily with immediate and often self-liquidating projects will add to the national wealth and afford a practical means of generat-

(*Continued on page* 72)

COLD WEATHER PROBLEMS

Last Winter and Next

I—Snow Removal in North Dakota

By RAY ROBINSON
Maintenance Engineer, North Dakota State Highway Department, Bismarck

SNOW removal is nothing new for the maintenance forces of the North Dakota Highway Department. However, with the heavy snowfall, low temperatures and high wind velocity almost anything can be expected.

The past season was one that will long be remembered by the employees of the department, as well as by the citizens of North Dakota. No great amount of snow fell until well after the first of the year. Until that time snowfall was recorded generally throughout the state and snow removal was put into operation; however, no difficulty was encountered. On January 24 a heavy snowfall blocked a large mileage of highways, but due to the fact that this was one of the first heavy snowfalls no great amount of trouble was encountered in opening the roads.

From this date on snow storms became more numerous and were accompanied by high winds. Being crowded for time between storms, the department could not hold its own. The snow soon won the battle, and the result was that in many cases large banks of snow accumulated along the shoulders. This was brought about by trying to open too many miles to keep highway transportation moving before starting clean up operations with snow wings and rotary plows. Many of these banks became very hard due to the thawing weather at intervals.

March Knock-out

The widening and clean up operations were just being completed when one of the most severe storms in the history of the state hit on March 16 and 17. This storm tied up all forms of transportation for several days. The following is a report that was put on the air by the department: "All federal and state highways are blocked. Blizzard condition prevails throughout the entire state. No snow plows working." On these dates visibility was zero; therefore no snow plows were able to operate.

It would be impossible to accurately estimate the damage done to equipment and to highways by this storm. When the storm subsided the temperature rose to above freezing. This made the snow wet and heavy and the roadways soft. Breakage of equipment was great, caused by the weight of the snow and the soft road surfaces. In many cases the drifts were twelve feet deep. Ten-ton trucks with V-type plows were put into operation. However, in many cases they could not break through the drifts. In order to speed up work and get traffic moving, rotary plows and heavy duty V-type plows were worked together. The V-type plows would open all drifts that they could handle. When they could not open the heavy drifts, they would back out and the rotary snow plows would be put in operation. As soon as the rotary plows had worked their way through the drifts the V-type plows would speed forward and open all small drifts until they encountered large ones; the rotary plows would then follow along behind at about twenty miles per hour.

Rotaries Dead-Headed

When the rotary plows are in operation they are a very slow moving outfit. Therefore it was necessary to dead-head considerable mileage. However, this was the only system we found to speedily open roads. Under ordinary conditions it is not practical to use a rotary snow plow for opening purposes, but when the going

Believe it or not—a snow storm in June. Photos taken June 4 on U. S. No. 2 west of Minot, No. Dakota.

Snogo cleaning out railroad underpass at Tagus, North Dakota, on U. S. Highway No. 2 Underpass was completely filled with snow.

The March snow was a humdinger. Scene at left on U. S. 10 west of Mandan; at right, U. S. 2 near White Earth, N. Dakota (appropriately named!)

is tough we find that the two units working together make an ideal combination.

One of the unusual conditions in North Dakota the past winter was that the snowfall was generally heavy throughout the state (see accompanying map), and required snow removal accordingly. Prior to this past winter heavy snowfall only hit sections of the state, and the department could shift its equipment to the heavy snowfall areas. In this way adequate equipment was available. However, the past winter found the department short of snow removal equipment.

Another unusual condition was that a heavy snow storm hit the northwestern part of the state on June 2, 1943. This storm blocked U. S. Highway No. 2 west of Minot, N. D. It was necessary to use rotary plows to dispose of this snow. As far as is known, this is the first time in the history of the state that any highways were blocked by snow in the month of June.

The department has 6,558 miles of highway which it attempts to keep open during the winter months.

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New Road Markings in Dimout Area

Special centerline marking is being provided on North Carolina roads in the coastal dimout area. The standard four-inch-wide continuous white line is given a reflecting element, consisting of glass beads placed continuously on curves and in 50-ft. strips alternating with 50-ft. paint strips on tangents.

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Covered Bridge to Be Preserved by Highway Commission

The historic covered bridge, which formerly carried Road 52 traffic over Flat Rock River at the southeast limits of Rushville, will be preserved by the Indiana highway commission as an example of pioneer road construction, according to S. C. Hadden, chairman. The bridge will become the central feature of a roadside park, plans for which are being prepared for the commission's approval.

Contour map showing snowfall in N. Dakota, winter of 1942-43.

If Wayne County Had Real Tussle

THE Wayne County, (Mich.) Road Commission's war-time resourcefulness in keeping equipment in repair paid big dividends last January. After an unusually "white winter," with more or less snow from Thanksgiving on, additional heavy snowfalls began January 15, giving the department the worst 10-day snow battle since 1918. The first fall was no more than "holed through" when a second, 6-inch fall necessitated beginning all over. Five and 6-foot drifts of powdery snow in the northern section complicated the task at first; then the whole business turned wet and heavy. By January 24, not only were the county's 40 miles of trunk lines inside and outside of Detroit cleared, but hundreds of loads of snow trucked away. And a large part of the 660 miles of county-secondary and township roads were open for milk deliveries, school buses, and for access to farms threatened with a livestock feed shortage.

This is one of several one-way truck plows which were widened for use on heavy patrol graders by adding a short "V" blade.

Wide Pavements a Big Problem

Wayne County's snow removal problem has a pattern all its own. The typical rural county farther north in Michigan must clear only for two-lane traffic; there the standard tractor V-type plow is often the main equipment. Wayne County, in contrast, has fewer storms but must clear a tremendously large area of wide pavement. The chief difficulty is along the superhighways, where clearing of an 80-ft. right of way, with multiple-lane pavements and 15-ft. sidewalks is complicated by heavy traffic and innumerable parked cars. No sooner will an area be opened than vehicles will come in and park, hampering further plow and loader operation.

Nearly 90% of Wayne County's snow job consists of widening after the initial pass, and the standard unit is the single-way truck plow. Two mechanical loaders are used to clear suburban shopping districts and a few V-plows for bucking drifts. Small sidewalk plows are extensively required along outlying arterial roads and streets. No rotaries have been used.

"Special" Semi-V Units

Altogether about 80 plow units are kept available. In addition to ordinary truck plows and patrol graders, several "special" units are in use. Three heavy one-way tractor plows were adapted to heavy-duty patrol graders. In order to bring the plows out to the width of the grader tires, a V-wing 2 to 4 feet wide was welded on by the county shop crew, using old structural iron and scrap metal for the apron and bracing (see photos). These unsymmetrical V-

In Wayne County, V-plows are used only in the heaviest drifts. The big job is to get over a large mileage of wide pavements with light one-way blades

One of Wayne County's loaders in action in Jefferson County in Wyandotte, a Detroit suburb. Wayne County has to clear many miles of suburban arterials, where parked cars are a plague

units have worked well, since widening passes can be made with less side throw of the grader. The added blade, while tending to equalize the thrust, throws only a small feathered windrow of snow back on the cleared side.

During the big storm, Wayne County even put several semi-trailer tractor units to pushing snow, equipped with one-way blades and weighted on the rear with pig iron or steel ingots. These units are from large tank trailers used in summer to haul dust-laying brine from a local salt well.

As in other highway organizations, every Wayne County road employee is on call night and day. One fellow's little son summed up his father's winter life when he said, "Gee, Mom, there's the phone again. Shall I wake, Pa.?" The men work two 12-hour shifts in emergency, and some double up on even longer hours. A dispatcher is employed to call them out and assign routes, the routing system being flexible to permit concentrating in varying localities as necessary. Much of the trunk system is cleared by trucks operating out of the central garage at Wayne. Local roads are handled out of three maintenance districts, each under an assistant superintendent who calls for special equipment and man-power as needed.

Wayne County claims numerous "firsts" in the way of snow plow innovations. It was first, many years back, to use a hydraulic plow lift, which reduced cable lifting from a 2-man to a 1-man job, the trick being done originally by installing a 3-way valve by which the operator could throw the oil from the truck's motor pump to a hydraulic ram on the plow.

Shortages of parts hampered snow removal last winter, a good many machines being laid up awaiting repairs during the last days of the big storm. But this delay was minimized by the county's notable parts-manufacturing and preventive maintenance program. (See ROADS AND STREETS, February, 1942, pp. 78-81.)

Leroy C. Smith is County Highway Engineer of Wayne County. Snow removal is under the direction of Richard H. Steketee, engineer of highway maintenance, and Milford Brown, General Superintendent.

III—Old Snow Plow Adapted to Heavier Duty

By R. E. TEEGARDEN
Division Engineer, Ohio Dept. of Hwys., Sidney, Ohio

FACED with a shortage of heavy-duty snow plow equipment last winter the Ohio Highway Department division at Sidney made four complete plows from old materials. In addition we have changed over forty truck plows from front-axle type, redesigning them to push in each case from an under-frame connection near the back end of the truck frame. This manufacturing and conversion job, in which salvage parts and materials were used practically 100%, included the following typical details (see accompanying photographs).

The undercarriage framing was built from sections of lattice bridge girder (see arrow A.). The vertical frame (B) consists of 4 in. salvage channel iron. The lifting iron above the ram was made in the state shop.

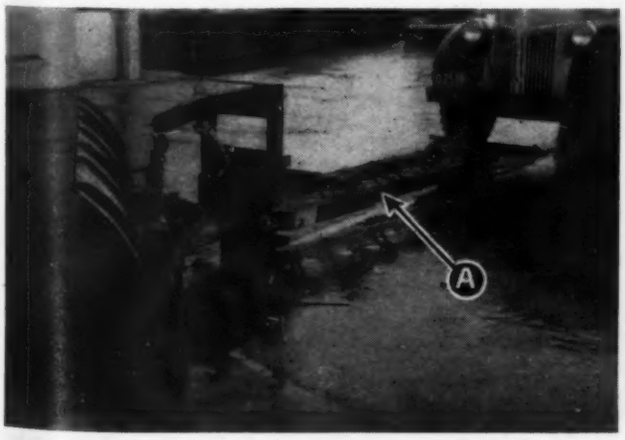
Looking next at the business end of this typical plow, the upper part of the apron consists of a salvaged plate (D) bent to shape. The lower part (E) is from an old Osgood moldboard. The hydraulic unit is new; the circle is taken from a scrapped grader.

The shoe assembly (F), made up in the shop, is also from salvaged material except for the 1½ inch vertical rod, which is from stock.

The bolt is designed to permit the plow to rise and fall with unevenness of the pavement. The entire plow unit can be quickly removed from the truck by removing cotterpins from top and bottom hinge bolts.

Pushing pressure is exerted from the back end of the frame, being transmitted to the underframe via a

Showing the plow removed. The frame is also removed and stored at the end of the snow season



The views of a typical plow unit, made up largely of salvaged parts and redesigned for back-of-frame connection. See article for the details

removable slide bolt extending through brackets welded to the frame.

These details are furnished as an example of our effort to make the best possible use of available road equipment these days, and at the same time salvage and conserve parts and materials. The converted units have proved able to withstand much heavier duty than front-axle connected plows, and rendered important service through the unusually severe winter just past.

This division's plows of all ages and including Wisconsin, Ross, Bross, Champion and other makes, are now all hydraulic, many having been converted from crawler-type chain hoist from year to year or as part of the under-carriage conversion here described.

Dean J. J. Jakosky of K.U. Resigns

J. J. Jakosky, dean of the engineering school at the University of Kansas since July 1940, has resigned to enter private practice. His resignation was effective August 1. Dr. Jakosky has accepted an appointment to direct industrial research at the University of Southern California.

Motor Vehicle Registrations Decrease 5½ Per Cent

Although the registration of private and commercial motor vehicles in 1942 was 5½ per cent less than in the peak year 1941, it exceeded the registration of 1940 by more than half a million. Public Roads Administration of Federal Works Agency reported July 23, 1943, after completing its annual compilation of motor-vehicle registration statistics from reports of State authorities.

Private and commercial registrations in 1942 totaled 32,582,242 or 1,878,776 less than in 1941. The 1942 registrations included over 1½ million fewer automobiles and more than a quarter of a million fewer trucks.

In the past 42 years in which motor vehicles have been registered, the only decreases previous to 1942 were recorded in 1938 and in each of the 3 years 1931-1933.

The decline in registrations is accounted for mainly by the fact that production of automobiles and of trucks for civilian use was stopped and rationing of available units began early in 1942.

Automobile registrations totaled 27,868,746 and trucks and truck-tractors, 4,608,086 in 1942.

Registrations of busses increased by 16,610 in 1942 compared with 1941, bringing the 1942 total to 105,410, the largest in the history of motor vehicles.

Registrations of publicly owned vehicles (exclusive of those of the armed forces) totaled 420,358 in 1942, compared with 381,829 in 1941 and 427,496 in 1940. Of these, 86,819 were Federal in 1942, 84,728 in 1941, and 143,175 in 1940.

Trailer and semitrailer registrations amounted to 1,433,989 in 1942, 1,434,349 in 1941, and 1,314,547 in 1940.

Characteristics and Destructiveness of Blasts

Completion of a Bureau of Mines investigation of the characteristics and destructiveness of air blasts caused by the detonation of high explosives, a problem of both peace and wartime significance about which little scientific information has existed, was announced July 3 by Dr. R. R. Sayers, Director of the Bureau.

Available to architects and builders, explosives experts and military authorities, quarry officials and mine operators, together with others interested, the report published by the Bureau presents factual and fundamental data pertinent to all these fields.

The information will be particularly applicable in designing government and other buildings to withstand the air blast or concussion from bombs and give occupants maximum protection should air raids occur, in protecting vital utilities and equipment above and below ground from bombs and the dynamite of the saboteur, in manufacturing demolition and other explosives, and in minimizing damage from blasting in rapidly expanding quarry and mine operations.

The second and concluding report on "Damage from Air Blast," prepared by Bureau scientists, the new publication presents the results of extended technical field tests conducted last year, including measurements of pressures produced in quarry blasting, measurements of high pressures from experimental shots, and observations on structural failures, particularly that of window glass.

The pressure measurements ranged from 0.0001 to 33.0 pounds per square inch and the explosive charges from a half pound to 4,000 pounds of dynamite, fired under various conditions. Measurement and calibration methods outlined in the report permit dynamic pressure measurements to be made up to 100 pounds per square inch with a high degree of fidelity at frequencies as high as 30,000 cycles per second. Pressure measurements made were correlated with structural failure, the effect of reflected pressure described, and a pressure-distance curve derived which is applicable for distances of from two to 100 feet. A practical index of damage from air blast also was determined and factors affecting the index were clarified.

From quarry tests in which various types of shots were studied, it was concluded that the problem of damage from air blast is insignificant under normal operating conditions for the pressures created in blasting were insufficient to break window glass at distances just beyond the range of flying rock.

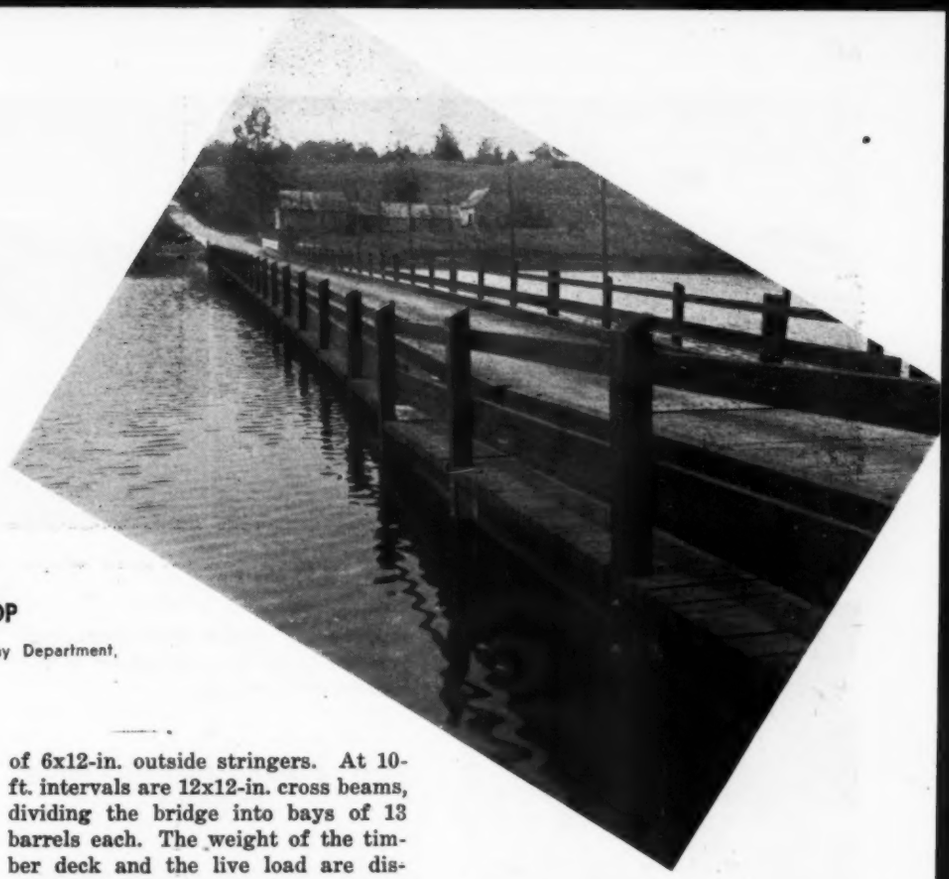
Among other conclusions which, of course, apply only to conditions comparable to those encountered in the investigation, were findings that doubling the weight of a charge of dynamite fired in the open air increased the maximum pressure by approximately 50 per cent; orientation of the dynamite had no effect upon the pressure wave; standard nitroglycerine dynamite produced higher pressures than commercial gelatin dynamite of the same weight; window glasses were shattered before any other structural failure was noted but fragments were not thrown far into the room; and pressures reflected or "bounced" from the ground and building and quarry walls influenced measurements and must be considered in any pressure investigation.

Methods of recording air-blast damage, together with a summary of experiments and results, are described in Report of Investigations No. 3708 by S. L. Windes, Associate Physicist, and a copy may be obtained by writing to the Bureau of Mines, Department of the Interior, Washington, D. C.

C. W. Lucas Resigns from Michigan State Highway Department

C. W. Lucas, Director of War Activities Division of the Michigan State Highway Department, has resigned, effective July 1. He will become assistant to the president the Great Lakes Greyhound Lines and Flint Trolley Coach Co. He will be located in Flint, Mich.

Bridge Floats on BARRELS



By A. D. BISHOP

Bridge Engineer, Vermont Highway Department, Montpelier

THE severity of last winter up in Vermont drew fresh attention to an unusual floating bridge, carried on a system of barrels which support an H-10 loading with their buoyancy and resist crushing by ice formation in winter.

The bridge in question carries a secondary state road across Colt's Pond at Brookfield, Vermont. Built in 1937, it perpetuates an old tradition by being the fifth pontoon-type bridge to be built at this location since 1812. It is of treated timber construction, designed with considerable thought to refinement in detail and constructed for permanence. The vehicular roadway is 12 ft. between curbs and there are 3-ft. walks on either side. Some 380 oak barrels of 50-gal. capacity, heavily tarred inside and out, are used in the 294 ft. of floating length.

13 Barrels per Section

The bridge is designed around 4 lines of 12x12-in. interior and 2 lines of 6x12-in. outside stringers. At 10-ft. intervals are 12x12-in. cross beams, dividing the bridge into bays of 13 barrels each. The weight of the timber deck and the live load are distributed to the barrels by means of steel rods resting across chains which in turn pass over the barrels (see photos). The shape of the barrels and their buoyancy, which assures that they "ride high," act to keep barrels squeezed upward and free of crushing ice pressures in winter.

Unusual Ramp Design

At each end of the floating deck is a 30 ft. timber ramp, which extends from a timber crib abutment to a point 17 ft. from the end of the float, to provide buoyancy and minimize settlement as live loads pass onto the float.

A slide joint enables each ramp to adjust automatically to the small (3 to 4 ft.) variations in height of this pond, whose sheltered location and absence of high waves or current make the floating design feasible. The ramp load is transferred to the float through three 12x12-in. stringers, top-armored with ½-in. steel plates. The float ends of ramp stringers are rounded to a 9-in. radius and steel-armored to facilitate sliding as the floating section rises or sinks under load change or variation in water level.

Heavy traffic plates, joined to form a big hinge, are set in the floor where ramps connect with the float. The leaf on the ramp side is anchored with lag screws, while the float side is free to move or slide.

The floor consists of 4x4-in. planking laid with ¼-inch. separation between planks. Roadway curbs are

How barrels are harnessed in panels of thirteen (center row of three per panel not installed when this photo was taken)

Showing structure completed except for deck planking and railing details

Note load-distribution system of steel bars and chains.

Armored stringers of ramp spans have rounded ends which slide on steel-plated cross planking

Details of the hinged armor-plate at point where live loads are transferred from ramp to float

8x10-in. timbers. A total of 72,500 bd. ft. of creosoted timber was used in the entire structure, which was designed under the writer's direction by the Vermont state highway department, H. E. Sargent, commissioner.

▼

Additional New Jersey Routes to Be Lighted

Continued State aid for additional counties and municipalities providing safety lighting on heavily traveled roads and at dangerous intersections was guaranteed under agreements approved recently by the New Jersey state highway commissioner.

The funds authorized by the Legislature from the automobilists' license fees and gasoline taxes were appropriated for an additional list of seventeen stretches of state road. Of special interest are the 14 units of 400 candle-power for the traffic circle junctions of Route 48 with New and Old Tilton Road, Pleasantville, N. J., which were installed by the highway department. Direct agreements have been made by the department to pay maintenance charges.

▼

V. W. Enslow Appointed Bridge Engineer

V. W. Enslow, heretofore acting bridge engineer of the Missouri State Highway Department, has been appointed bridge engineer.

W. D. Chrisman, heretofore acting division engineer at Springfield, Mo., has been made division engineer.

▼

Roller Made From Tractor

The city of Springfield, Ill., boasts a neat machine of mixed ancestry. It's a 3½-ton roller made by boxing in the rear wheels of an International Tractor and filling wheel drums with water. A local boiler factory made up this job to city "specifications," which also included a special frame and connections for utilizing a front roller unit.

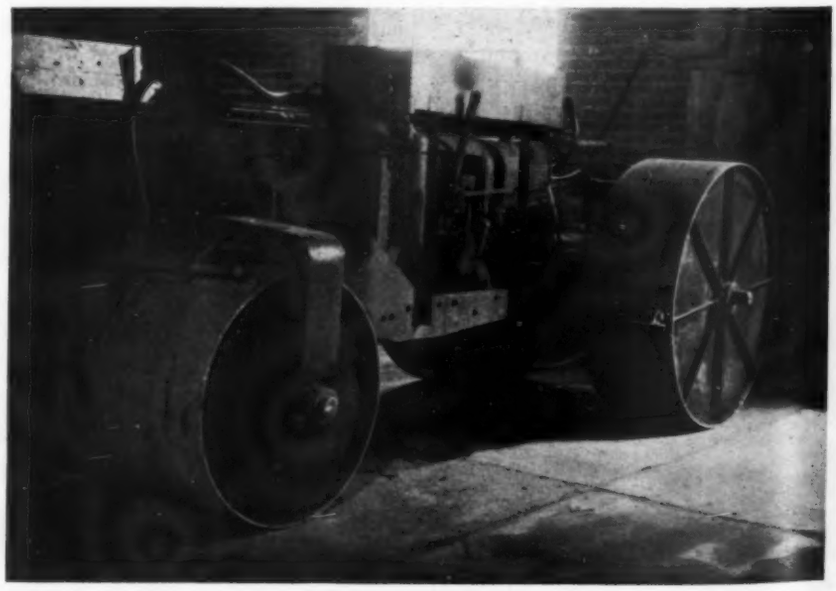
"It works fine, according to city engineer Lewis H. Lush, who, however, admits that he intends to install front roller bearings when he can get parts.

▼

A.A.S.H.O. Bridge Committee Holding Sectional Meetings

The Bridge Committee of the American Association of State Highway Officials met during August in various sections to approve new specifications to replace the present ones dating from 1941. Acting head of the committee is R. B. McMinn of the Portland, Oregon, office of Public Roads Administration, appointed to hold the meetings in the absence of Chairman Raymond Archibald (PRA, Washington, D. C.) who is temporarily on the Alaskan Highway.

Representatives of six western states met at Crescent City, Calif.



Roller

Utah's First Flight Strip

By W. L. ANDERSON
Chief Design Engineer,
Utah State Road Commission, Salt Lake City

AMONG the notable projects under the Utah state road commission this year is a flight strip which has just been completed "somewhere in Utah." Typical state bituminous road practice was adapted for this job, which utilized excellent local materials and required relatively little excavation due to the favorable site. Actually, the problem was not so much one of leveling as of grading to provide the necessary transverse slope. Crown material came largely from pits paralleling the strip, and surface gravel from pits averaging only 10,000-ft. haul.

The project comprises a 150 x 7,130-ft. oiled gravel mat, set in a graded and partly graveled area 500 x 9,130 ft. As shown on the accompanying cross-section, the graded field is flanked by shallow borrow pits, 250 ft. wide, which act as side ditches.

10½" Processed Material on Rolled Sub-Base

Grading involved an A-4 silty soil which compacted readily under sheepsfoot rollers and the hauling scrapers. The sub-base consisted of 5 in. of rolled gravel base placed 160 ft. wide under the runway area. This course was blanked with a second 5½-in. gravel course, 325 ft. wide and feathered out on the berm, the portion under the runway being placed, sprinkled and rolled in two lifts. The upper lift consisted of crushed gravel of 1-in. max. size, suitable for mat processing.

The surface mat is a road-mix of the top 2½ of gravel, processed in strips 21 ft. wide. Each strip was completed full length before going to the next strip, the contractor working across the field from one side to the other.

Gravel for processing was spread, turned over and bladed until thoroughly uniform, rolled, then sufficient material scarified and windrowed to produce the specified depth of mat. After applying approx. 1.75 gal. per sq. yd. of MC-2 the mix was processed and rolled and sealed with RC-3 and 20 lb. chips. A notable detail was the thoroughness in rolling. Eight-ton tandem rollers and 5-ton trucks loaded to capacity with sand gave the mat double the rolling usual for a road job, this precaution being considered necessary in view of the very low intensity of traffic expected over any one area in normal flight-strip service.

Careful Work at Lane Edges

Special care was taken to avoid joint planes and pockets between the adjoining lanes. The contractor succeeded in obtaining excellent bond by careful roller work and by keeping hand shovelers in readiness along lane edges to throw down or rake material in conjunction with rolling. Careful management of the blades was also a factor, the trick being to strike off the loose material at exactly the right height, or about one-half inch above the adjacent rolled lane.

H. T. Reynolds Springville, Utah, was the contractor.

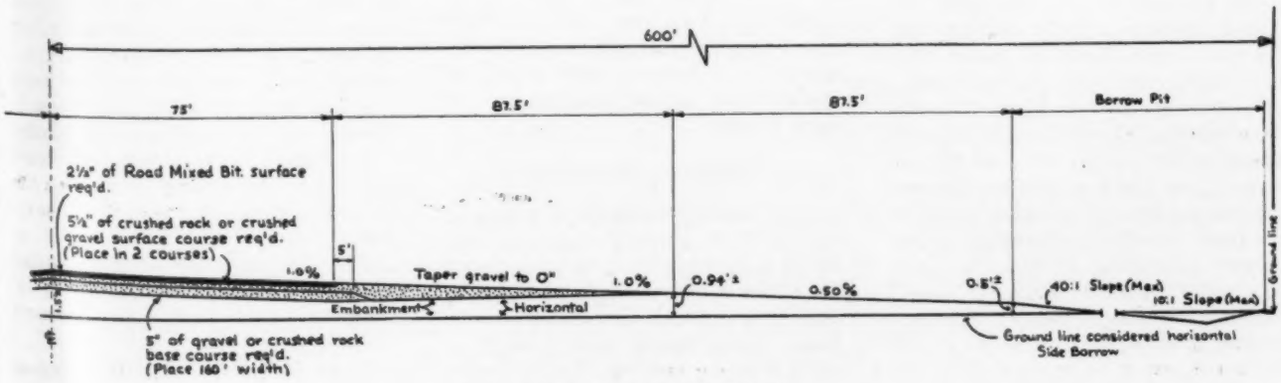
Drainage of surface run-off was a major design consideration. The 1.0 and 0.5 per cent transverse slopes (see cross-section) give a 29-in. rise at the centerline of the 500-ft. graded area, which was considered a practical minimum dependent on obtaining a true surface that would remain relatively free from pockets. No under drainage was provided.

The flight strip was constructed by H. T. Reynolds of Springville, Utah, at a unit-price contract bid of $409,000. This figure included the construction of three and one-half miles of 20-ft. graveled approach road, connecting the field with an important east-west arterial highway. The design was prepared by the Utah state road commission, John S. Evans, chairman, in cooperation with the Public Roads Administration, and was financed with funds made available to the Public Roads Administration for flight strip construction.

Indiana Motor Vehicle Accidents Decrease 47%

Motor vehicle accidents on the state highway system during June showed a decrease of 47 per cent from the same month in 1942. Reports filed with the Commission's bureau of traffic show 677 accidents during June of 1943 as compared with 1,289 accidents listed in June 1942.

The decrease in accidents was accompanied by a reduction in the number of fatalities, which dropped from 46 in June 1942 to 11 in June of this year; in the number of persons injured, which decreased from 671 to 307, and in resulting property damage.



Cross-section of the Utah flight strip.

Good Management Saves Labor on Widen-Resurface Job

Flexible handling of crews hauling men to avoid time lost in walking along project paid dividends on Indiana Asphalt Company contract

THE scene was along Route 45 in southern Indiana a few weeks ago.

The business at hand was a 7.6-mile contract to widen and resurface this route for heavy trucking and army camp traffic. Scattered out over a distance of two miles were fifty or more men, engaged in all phases of building a 2¼-ft. asphaltic concrete widening strip along one side, similar widening having already been completed on the other side.

"John", said contractor George Brillhart of Indiana Asphalt Paving Company to one of his men, "set your tractor to one side and I'll ride you down to the other end." Contractor Brillhart was not giving the lift just to be a good guy (which he really is), but was carrying out a systematic policy of shuffling his men back and forth between tasks to speed up the job.

Before the day was out, acting as his own "visiting foreman" along with superintendent Charles Reddick, he gave no less than twenty-five such lifts. "I can't afford to have any of my men walk far along the job", Brillhart explained, "so I drive them to save their time as I go along checking up on the work. We're 50 men short due to the labor scarcity. At $1.50 an hour for skilled labor I figure I'm making wages more ways than one by moving men to help them get in more minutes of productive work."

No "One Machine" Men

Contractor Brillhart uses three other practical means of getting along short handed. One is to shift his skilled operators around over various machines from hour to hour. "We don't have any 'one machine' men" he explained. To help keep all operations moving along the best distance ahead of each other, one man for example often divided his time between the tractor-drawn widening plow at the front end of the job and the patrol grader backfilling at the rear end. The roller operator when he wasn't running the heavy asphalt roller back of the spreader, was up ahead on the subgrade trench roller, or helping unload and spread asphalt.

George Brillhart, vice-president of Indiana Asphalt Co., Indianapolis, and a joint tarring outfit of his design. This firm, which also includes C. I. Brillhart and W. C. Richter, has been going strong since 1915, having built hundreds of miles of asphalt roads and repair jobs, including six widening and resurfacing contracts totaling over 20 miles last fall and this year

Even the office bookkeeper spent part of his time out on the job, due to a shortage of timekeepers.

Second, as a job-speeder, gangs were not kept fixed but fluctuated in size almost from minute to minute. A quick look, for example, would show whether the 10 men setting forms should be increased to 11 or 12, or reduced to 8 or 9 for a while.

Third, the green hands—of which there were plenty—were shown constantly how to do their work better and look after their own safety. "Don't stand in that stuff and burn your feet", Brillhart pointedly reminded two new asphalt rakers as one instance. All the older men helped show others.

Widening Procedure

This contract included widening of an old 18-ft. asphaltic concrete road to 22½-ft. by adding a 27-in. strip on either side, and resurfacing the full 22½-ft. with an asphaltic concrete binder course and a rock asphalt wearing surface. The procedure was to complete the widening on one side for the full distance, then complete the other side, then apply the resurfacing.

The widening outfit included about 10,000 lin.-ft. of steel road forms; a tractor-drawn widening plow for trenching away the existing shoulders; a heavy-duty patrol grader for further clearing loosened material and leaving a semi-finished shoulder subgrade; a trench roller and pavement edge trimmer; a home-made joint spray; a 10-ton two-wheel asphalt trench roller; up to a dozen 1½-ton asphalt dump trucks; hand operated spreader box; several light trucks for moving forms, hauling fine aggregate, etc., and an 80-ton-per-hour asphalt plant with clamshell crane for stockpiling and loading bins.

While this job was let in 1942 and some work was done before winter, real work could not be resumed until June this year because of the long wet spring. Once started, however, the widening crew working one 12-hour shift checked off at the rate of nearly a mile a day in best weather, and the binder course followed at the rate of 600 to 700 tons a day using a mechanical spreader with automatic crown adjustment.

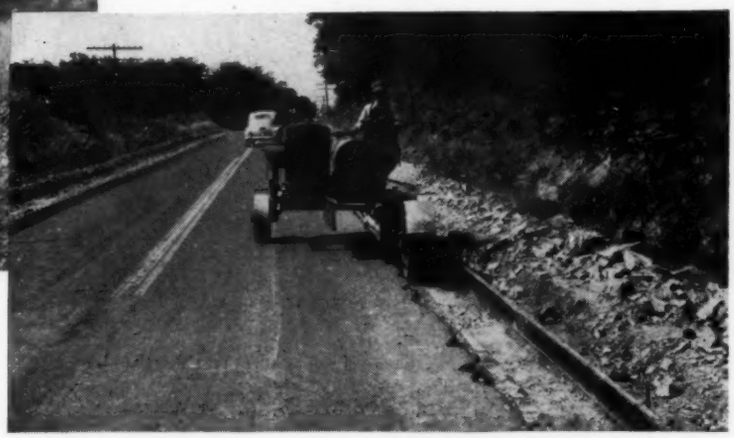
Notes on Design and Specifications

The 7.61-mile job called for 12,000 gal. prime material, 7,500 gal. seal, 800 tons subgrade fine aggregate, 250 tons covering aggregate, 16,400 tons of bituminous concrete, and 2,960 tons rock asphalt.

The shoulder widening consisted of a 27x6-in. base of asphaltic concrete placed at about 280 deg. F. and rolled in two layers. Steel forms were required, and spreading was by hand (mechanical spreading optional). Special attention was given to repairing all edge failures that had occurred before or during excavating the shoulder. Exposed edge of old pavement was painted with AES-2 or MC-1. Fine aggregate was compacted in the subgrade to a depth of 1½ in. where the existing material wasn't satisfactory.

Shoulder material backfilled against the widened base was compacted by

First comes the widening plow



Then the form erection and fine grading crew, followed by a trench roller

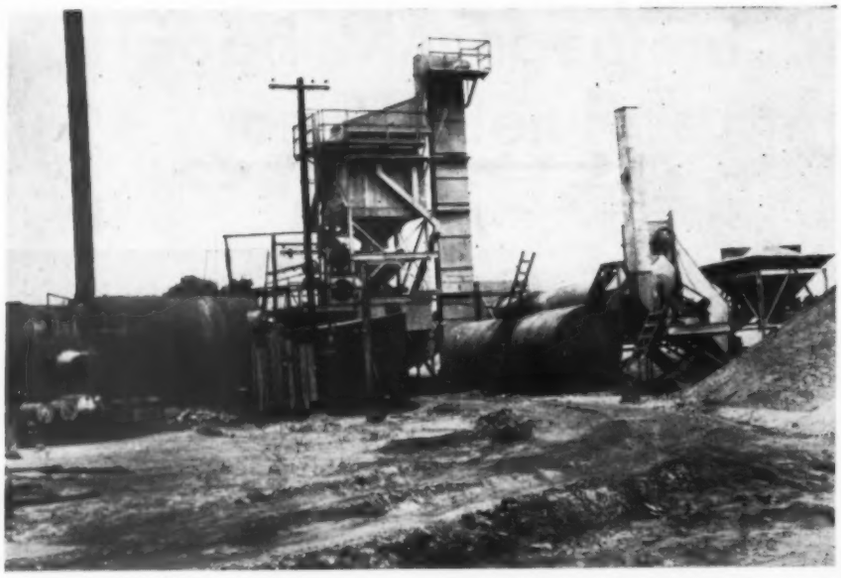
Hot-mix was next dumped and raked, the absence of suitable mechanical equipment being offset by crowding plenty of men on this operation

The roller kept one foot back of the forms on the first pass, to avoid too much lateral displacement of the mix and bulging out of the forms

Step by Step

The roller covered the full width of the second pass

Backfilling after form removal. The job is now ready for tack coat and mechanical spreading of rock asphalt surface course



Indiana Asphalt Company's modern asphalt plant layout

the motor grader tires (specifications required "4-ton truck").

Priming the old surface and widened base consisted of 0.10 per sq.yd. of AE-150 or RC-1, which was preceded by brooming and patching of defects in the old pavement. The binder course consisted of two 1-inch layers of bituminous concrete, required to be laid at the rate of not less than 400 tons per day, (A seal of RC-3 or AES-3 plus 10 lb. of chips was specified for any binder course left uncovered through winter). Rock asphalt (¾ in.) was required to be placed immediately following rolling of the binder course.

Indiana Resurfacing Policy

This job is part of a state-wide selected program of resurfacing by the Indiana State Highway Commission under Chairman S. C. Hadden. According to N. F. Schafer, state superintendent of maintenance, generally speaking the commission feels that a road worth surfacing with high-type material should be at least 20 ft. wide. All 18-ft. roads are widened to 22 ft. before they are resurfaced. Old bituminous surfaces are widened with hot-mixed bituminous concrete and resurfaced with a binder course and wearing surface, as done here. Old 18-ft. concrete surfaces are widened with cement concrete or hot-mixed bituminous concrete, then resurfaced with a binder course and wearing surface.

Robert Weikert, project engineer

The condition of the surface and base-in-place controls the amount of binder that will be applied. An exceedingly rough surface naturally requires an increased depth to restore the proper cross section and add sufficient material to strengthen the base.

State highways are resurfaced when, in the opinion of the engineer, the base in place is approaching failure or has failed to such an extent that a resurfacing is necessary to salvage the investment in place.

Specific materials to be used for the resurfacing of each project, are determined by estimating the cost of each comparable method of improvement. The one costing the least is selected. This procedure automatically takes into consideration the size of the project as well as the availability of the various types of mixing plants and materials.

Gas Consumption Decreases 17 Per Cent

American automobile users consumed nearly 20 billion gallons of gasoline during 1942, a decrease of 17 percent under 1941, gasoline tax collection records compiled by the Public Roads Administration of the Federal Works Agency showed today.

The 1942 total on which gasoline taxes were levied was four billion gallons less than in the preceding year, according to reports of State agencies to the Roads Administration.

Total State gas-tax collections, plus receipts such as inspection fees, dealer's license fees, fines and penalties aggregated $845,803,000 for 1942, compared with $958,013.000 in 1941. Taxes on aviation gasoline—$948,000 in 1942 and $701,000 in 1941—are included, but refunds for nonhighway use amounting to $63,264,000 in 1942 and $57,214,000 in 1941, are excluded from total receipts.

The average gasoline tax per gallon for all states was 3.99 cents in 1942, the same as for the previous year. Rates of State taxes ranged from 2 to 7 cents per gallon.

The greatest decrease in gasoline consumption, based on amount taxed, was reported by New Hampshire, with 31 percent fewer gallons in 1942 than in 1941. Eastern seaboard States where gasoline rationing began May 15, 1942, reported declines of 17 to 31 percent for the year.

In the area rationed beginning December 31, 1942, Missouri, Montana, New Mexico, Oklahoma, and Wyoming also had reductions of 18 percent or more. In the other states in this area there were smaller decreases.

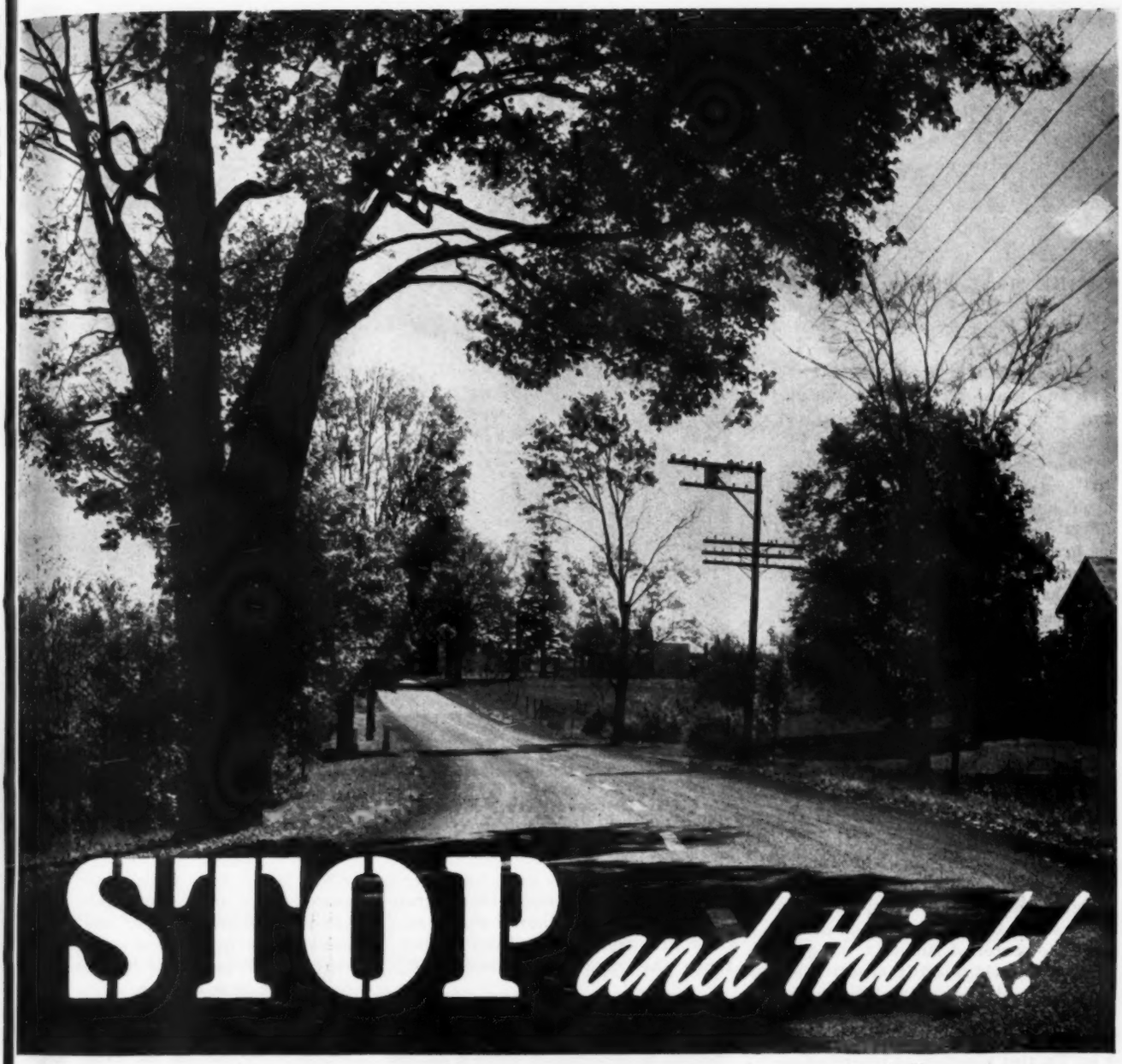
Inter-American Highways Nears Completion

The outstanding example of cooperation between several nations in constructing a major highway of mutual benefit is furnished by the Inter-American Highway, which is that section of the Pan-American Highway located in Mexico and Central America. The road will furnish an overland route direct to the vital Panama Canal. Progress up to April 1943 is related in the following statement prepared by the Public Roads Administration.

The years 1942, 1943 and 1944 will be memorable in the history of the construction of the Inter-American Highway.

In 1942 negotiations were completed and construction was started which will open an emergency truck road largely on the final line, but with some alternate sections, through Central America to the Canal Zone. It is expected that a 29-million dollar construction program will be fully under way in 1943, and that by June 1944 continuous main-line or alternate sections of the Inter-American Highway in Central America will be in shape for emergency trucking operations on a scale that is expected to meet probable demands.

AIRFLEX CLUTCH — A 20-page catalog illustrating and describing its new Airflex Clutch has been issued by the Fawick Airflex Co., 9919 Clinton Road, Cleveland, Ohio. This clutch operates on a principle entirely new in clutches—the principle of a tire-like rubber gland, expanded by air pressure to effect a union between the driving and driven members of any machine.



DESPITE gasoline rationing and rubber shortages, America's roads are actually wearing out faster today than in peacetime!

This is an urgent problem, needing immediate thought and action. With truck traffic up more than 40 per cent, with 4,500,000 trucks carrying raw materials and finished goods, and with workers traveling to and from their jobs, MAINTENANCE is the watchword of the hour.

America's unmatched highway system is the nation's busiest assembly line—essential for the swift transportation of vital military supplies, war workers and farm produce. Now more than ever before, it must be kept functioning at full capacity.

Call in the Barrett Tarvia field man today. There is a right type of Tarvia for every need in road maintenance and repair, and he knows them all, knows the best Tarvia methods for dependable, low-cost paving service. Let him help you keep your roads clear for a victory-bound America!

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Bridge Repairs and Construction with Salvage Material

By R. E. TEEGARDEN
Division Engineer,
Ohio Department of Highways,
Sidney, Ohio

THE use of salvage steel and lumber in bridge repairs is an interesting feature of our maintenance in western Ohio. Long before the war made it acutely necessary to save and re-use structural materials, the Ohio Highway Department, of which H. G. Sours is director, followed this practice as a matter of thrift. Because of the large number of old narrow and inadequate bridges inherited from horse and buggy days, the bridge crews always had more replacement and repair jobs than they could handle. Now their salvage experience is standing them in good stead.

Four small bridges were modernized early this summer with old steel shapes. Floor systems in each case are being strengthened by use of 7 in. and 12 in. I-beams from dismantled spans.

An example of a similar job constructed during 1942 is shown in the accompanying photo. This rather unusual floor framing is laid out to utilize available salvaged shapes. The bridge consists of three spans on a sharp skew, 20′-7″, 40′-6″ and 20′-7″ center to center of supports, designed to replace a single 56-ft. truss. Piers consist of old I-beams stubbed out of concrete footings to make bent piers. Caps are made up of double lines of 8 in. I's, tied together at intermediate points with web plates. End span beams consist of four lines of 21-in. I's. Center span beams are 33-in. and floor beams, 10-in. I-beams. The deck will consist of a 2x4-in. strip floor, using salvaged lumber. All structural steel is from old bridges except the 33-in. beams, which are from stock.

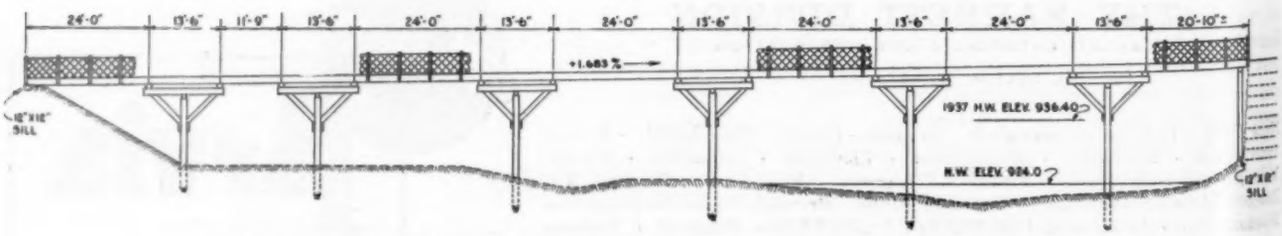
At Sidney, Ohio, pedestrians will cross here for the duration over a foot bridge built 100% of salvage timber and hardware. Note concrete piers in place for an eventual permanent traffic bridge

Beam Sections Spliced; Strength Tests Under Way

When a bridge is wrecked or dismantled for replacement, every scrap of metal is saved. Short I and H sections are kept in the division shop. When the inspector discovers badly rusted spots in a floor beam on an otherwise sound bridge, the rusted sections are burned out and replaced with sound pieces of the same, or equivalent cross-section.

Old bridge partially removed to make room for the modern structure, since postponed

Sometimes pieces of I-beam only a few inches long are welded together to get a section of the exact length needed for such a replacement. Or channels are welded back to back to provide I-beams. Beam lengths are joined variously with a welded splice at top, bottom and sides; spliced on the bottom and welded on top; spliced top and bottom only; or butt welded throughout. Tests are being made at the state highway testing laboratory at Columbus to determine the weld necessary to bring the beams to original strength.



These novel structural features were adopted to utilize available salvage piling and timbers

Even a deepwater Navy must have land bases for repairs and construction, storing supplies, and training of personnel.

The ability of Cletracs to stand rough treatment when the going gets tough, their rugged power and ease of control—due to controlled differential steering—are being used to speed naval construction. The building of roads, air fields, and training stations, as well as the handling of materials and munitions, is expedited daily by the efficiency and economy of the controlled power of Cletrac tractors.

NO PRIORITIES ON WAR BONDS

Next to the Stars and Stripes, Cletrac is proud to be flying the Minute Man flag. Over 95 per cent of Cletrac employees are purchasing War Bonds by pay roll deduction.

Now that equipment is difficult to replace—owners appreciate that Cletrac dependability and enduring quality must be protected and prolonged by regular and proper service even more than in peacetime.

Your Cletrac dealer is prepared to help you get the best out of all your equipment. His service facilities and trained, experienced mechanics will help you make the most of your Cletrac power—to speed construction for Victory.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO

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FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

Emergency Foot Bridge of Unusual Design

Late in 1941 at Sidney, Ohio, contract was let to replace an old bridge over the Miami River at Court street. Although vital to traffic movement in and out of the downtown area, completion had to be postponed because of the war. Only the concrete piers and abutments had been built at the time the War Department shut down on the steel superstructure.

In order to get pedestrians across the river, it was decided to erect a temporary foot bridge of non-critical materials. The division bridge office first considered using the permanent piers and driving intermediate timber bents for this purpose. But it was foreseen that a parallel bridge usable during the subsequent completion of the permanent bridge would be highly desirable. A survey was made of available timber, which resulted in the interesting design shown. The pedestrian bridge as built consists of a 6-ft. deck, equipped with a balustrade of salvage 2 wire guard fence; 9x15 salvage stringers, 26 ft. long, supported on T-supported caps to complete the 35½-ft. spans; and old lengths of piling. The 4x6 posts and 3-in. planking in the deck are from an old truss structure of other days.

Timber, hardware and all, this bridge uses practically 100 per cent salvage materials.

This 3-span skewed bridge was constructed in 1942 using shapes from bridges dismantled elsewhere in western Ohio

Various types of welds used to splice odd pieces of salvaged I-beams for floor beam replacement. Left to right: spliced top, bottom, sides; welded top, spliced bottom; spliced top and bottom; butt welded throughout

We Want to Build . . . Not to Rebuild*

Let's have done with this talk of reconstruction after the war and begin to think in terms of construction.

To reconstruct is merely to rebuild . . . to duplicate the old which has been destroyed or worn out in service. To construct is to build anew . . . with new concepts and new methods to serve new and better purposes.

In a world-wide sense we surely cannot build anything lasting on the ruins of those things which have caused so much misery and trouble in the past quarter century.

It is a new world which is to come out of the present conflict with new hopes and new ambitions. The old Europe, Asia, the old India with all of its hates, its fears and bitter enmities surely cannot be reconstructed for to do so would only duplicate the old. A new "old" world must be constructed just as we, here in our United States must build a new nation. New in our faith, new in our concepts of freedom and new in our relationships with our fellow men and with other nations. Of course like good architects and good engineers we plan the new out of our experiences and with the principles which we have learned are fundamental.

In the great task which will confront us after the war we should not, we must not think of rebuilding. We must build. Instead of rebuilding the old highways, torn and rutted by the pounding wheels of huge trucks, we should build new, broad highways and alongside them the landing strips where air-borne traffic can land and take off in emergencies.

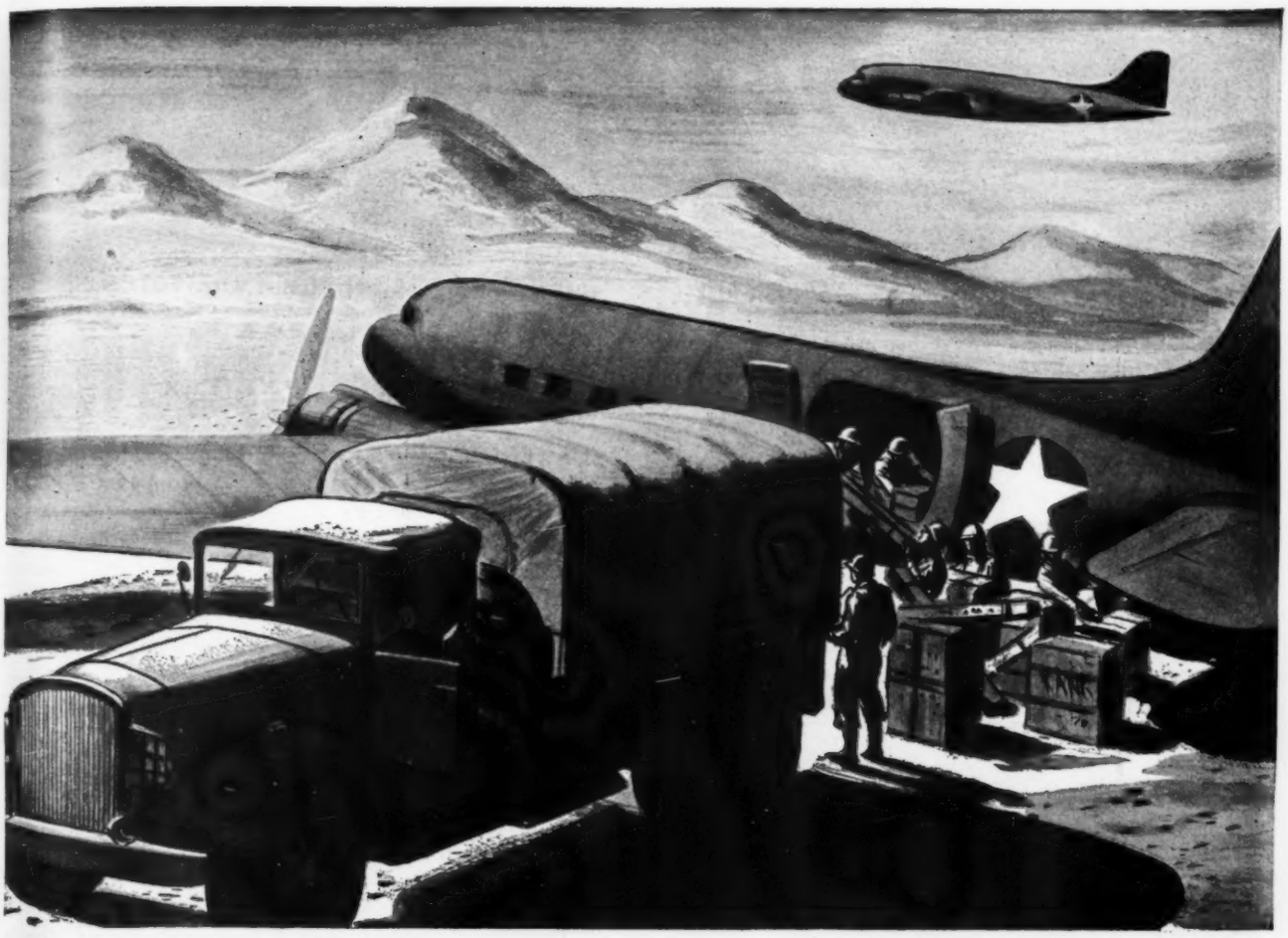
We must build great, new airports . . . not rebuild the old ones for they were conceived to serve a much smaller purpose and are, in the main, already inadequate and obsolete in their facilities.

We must build new dams for more electrical energy, to water desert places where we will grow our own rubber and produce other things which have been woefully short in this war. We must water new acres for greater food production for we will be called upon to feed millions of people for some time to come.

We must build greater service fa-

(*Continued on page* 70)

*From Construction Equipment News—a publication of the Associated Equipment Distributors.



YOU SAID IT, SOLDIER

"The lumbering unprotected C-47's have become the aerial Mack trucks *of this war in North Africa"*

—from "Stars and Stripes", the soldiers' newspaper

If you've ever seen a Mack in action, you know why Stars and Stripes' soldier-reporter called those husky Douglas Skytrains "Mack trucks". For years, Americans have used the word "Mack" as an adjective to mean the best in cargo-carrying dependability.

Soldiers learned to respect Mack trucks in the last war. They watched Macks plow through Argonne mud so deep you couldn't see the wheels. In World War II, they're seeing even better Macks take even bigger loads through worse mud—and through shifting sand and freezing snow as well. They know a Mack will haul whatever you've got wherever you want it to go!

Yes, the soldiers in this war, too, will know what the phrase "Built Like a Mack" *really* means!

Mack Trucks, Inc., Empire State Building, New York, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS

FOR EVERY PURPOSE

ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY...IF YOU PLAN TO GET ONE, YOU'RE WISE!

Editorial

YOUR ROADS HAVE HELPED IN SICILY

YES, and Tennessee roads aided in Guadalcanal and, in fact, our whole highway system has played a role in mobilizing for war that is only now beginning to be analyzed and seen in its full magnitude.

In one state nearly five hundred scattered war service plants were built with highways as construction supply and maintenance lines. A single project required more than a million tons of construction hauling.

A forthcoming article will present figures on war-generated traffic that should make every highway engineer, contractor, maintenance employe and road worker feel proud—and realize that his work indeed has been essential in the war effort.

▼

WOMEN WORKERS ONE SOLUTION

"IF IT ever comes to where I've got to work with a bunch of women, I'm through."

A highway shop superintendent exploded thus the other day, and he's not the only woman-shy fellow your editor has met in his travels this summer. Most roadbuilders, having worked in a man's world all their lives, are naturally slow to get used to seeing women doing men's tasks.

But it's one solution to the serious personnel shortage in highway and street departments and contractors' outfits. The California Division of Highways, which has been harder hit than perhaps any other state highway department, has begun to train women for a number of light maintenance and semi-technical jobs. They'll be assigned as weighmasters, stock room assistants, draftsmen and tracers, and even out on survey parties.

In one California maintenance district women of Indian extraction have been employed at lighter tasks out on the roads.

West Coast road contractors, too, are finding increasing use for women at tasks such as time keeping, material checking, etc., and even as truck drivers.

As around industrial plants, it takes time for men workers to get used to the idea. And there are new problems in training and supervision. But with intelligent selection for aptitude and with brief training, women can in few weeks begin to occupy numerous empty desks and benches. The city of Cincinnati has proved this; in three weeks young women in the municipal garage learned to do certain electrical and carburetor repair operations with satisfactory skill and speed.

▼

ANOTHER PHASE OF THE SHORTAGE

HIGHWAY workers should have an essential rating of some kind everywhere, to help keep up essential maintenance. But in coastal or "combat area" states there should be a special category. California state highway engineer G. T. McCoy points out that he has no men to guard highway bridges, nor has he authority under existing laws to arm guards could men be spared. The San Francisco Bay Bridge, for example, is only lightly guarded while railroad structures in the area are bristling with protection. War workers and armed forces travel this great bridge on passes equivalent to $40,000 a month in peacetime tolls, which gives an idea of the vital importance of this bridge to the Bay area in wartime.

The double-decked Pitt River bridge near Shasta Dam—the one with the record-height submerged piers—is another case in point. The railway deck below is heavily guarded. The highway level above is virtually unguarded.

This is just one more phase of the manpower problem which continues to remain unsolved in the highway field as well as in many others.

▼

SMALL BRIDGES AGAIN

LITTLE has been said lately about the need for new bridges. When the war came along many states were just beginning to see daylight in a long job of retiring old horse-and-buggy structures.

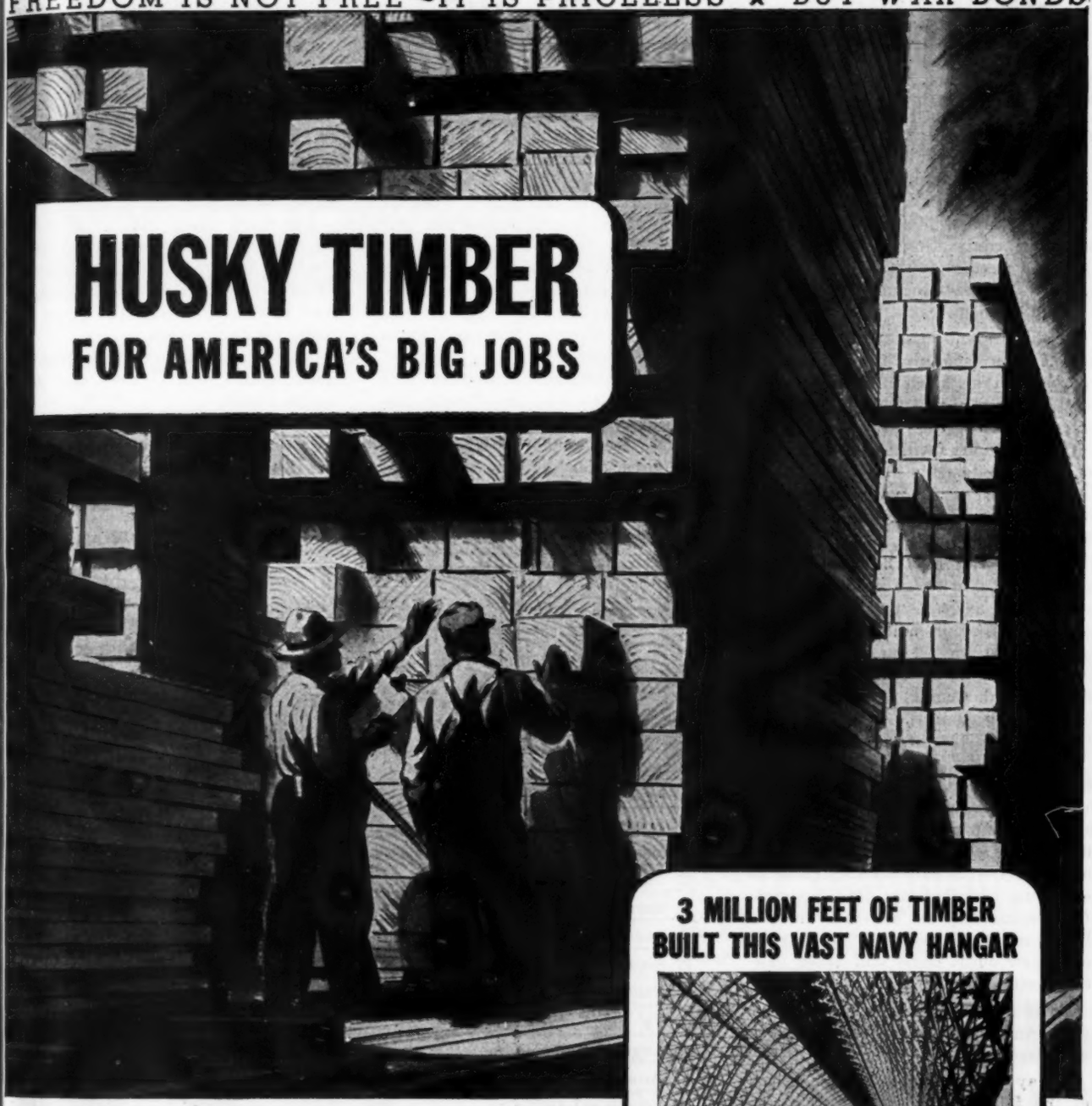
Well, more than one tank on maneuvers has gone through an old bridge in recent months. The prosaic work of bridge and culvert replacement must somehow go on today, and it should figure high in post-war plans. In Ohio scrap metal and Yankee ingenuity have kept this work rolling. (See page 60.)

Out in California the state highway bridge department has rated all its old bridges, napped every structure that won't carry certain sizes of tanks, and issued elaborate detour schemes to aid military maneuvers and convoys. Meanwhile many an old truss is carrying lumber and industrial trucks far exceeding standard stress limits.

Which is just a further reminder of the post-war bridge replacement job.

FREEDOM IS NOT FREE—IT IS PRICELESS ★ BUY WAR BONDS

HUSKY TIMBER
FOR AMERICA'S BIG JOBS



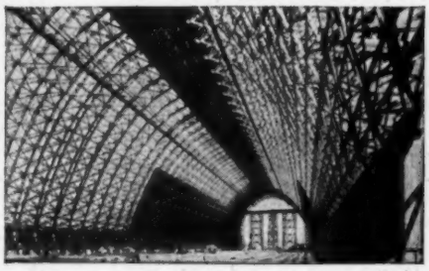
The TECO Connector System of timber prefabrication makes it possible to employ timber *efficiently and economically* in heavy structural engineering. Many great war plants, shipyards, docks, warehouses, hangars, bridges, and towers have been built entirely of timber under the TECO Connector System. From the lumber to the finished unit, every step in modern prefabrication is controlled by sound engineering practice. The use of TECO Split-Ring Connectors and TECO precision grooving tools results in a high degree of speed, both in assembly and in erection.

For Modern Timber Construction *Specify* **TECO** Timber Connectors and Tools

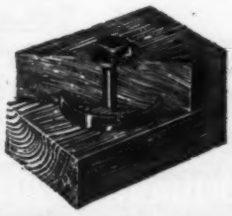
Sponsored Since 1933 By The National Lumber Manufacturers Association

WRITE FOR TECO'S FREE LITERATURE AND LIST OF ENGINEERING SERVICES

3 MILLION FEET OF TIMBER BUILT THIS VAST NAVY HANGAR



Construction view of one of the Navy's mammoth new blimp hangars. Length 1,000 feet; clear-span width 237 feet; height 153 feet. Timber prefabricated by Timber Structures, Inc., Portland, Oregon.



The **TECO** *Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*

WASHINGTON, D. C. TIMBER ENGINEERING COMPANY PORTLAND, OREGON

Springville—"Where All the Contractors Come From"

SPRINGVILLE, UTAH, is a small city of some 6,000 population, and unless you live in that vicinity you probably have never heard of it. But this little community, located fifty miles south of Salt Lake City, is known far and wide among the intermountain contracting fraternity, as the headquarters for a "whole flock" of road builders, including some of the best of them.

At the present time the Springville boys are an especially busy group of citizens, either hard at work on or just finishing up their share of Utah's access road program, area roads, airports, housing facilities and other major improvements for the State's $200,000,000 war-industry developments and its great military centers.

Like all beginnings, the origin of this concentration of builders has a natural explanation. According to the old timers as well as the present group engaged in building, the contracting first started out as freighting from one community to another. When the old Utah Central Railroad began its construction in the 1860's the several families turned their attentions from freighting to sub-contracting on this railroad. It was from this very humble beginning that emerged the present group of men engaged in the business of construction. From these old timers, foreman, sub-contractors, and sons branched out into business for themselves, as the rich middle Utah country developed, and from each new outfit came still other new contracting talent.

Several firm names have come and gone and new combinations formed and dissolved.

Today Springville is indeed proud of the following "local boys":

W. W. Clyde and Company has the new Ogden bypass highway and the new diagonal highway into Ogden; also the access road to the Naval supply depot at Ogden; has recently completed the airports at Delta and Logan and the access road to the Japanese concentration camp at Delta. W. W. Clyde is the present Mayor of Springville.

A. O. Thorn & Sons Const. Co. is the contractor for Redwood Road which leads to the Small Arms plant near Salt Lake City and they also have work going on at the Hill Field Air Depot. A. O. Thorn is immediate past Mayor of Springville.

Strong and Grant along with Ryberg Co. are supplying the sand and gravel and batched concrete for the giant Columbia Steel plant located at Geneva. They also have a large housing project located at Dragger in Carbon County. They also did the major portion of the cement work on the runways at the Hill Field Air depot.

J. M. Sumsion's outfit is building the 12th Street access road at Ogden and they also have 35 miles of road work to the Dugway Proving Ground in Tooele County.

Deal Mendenhall is working with Gibbons & Reed at the Tooele Ammunition Dump.

V. C. Mendenhall, a brother, has the contract for the new access road from Stockton, Utah, to the war Chemical plant at St. John. The Mendenhall boys, by the way, are typical second generation contractors. Their father, Guy Mendenhall, has ranked high among the state's road builders.

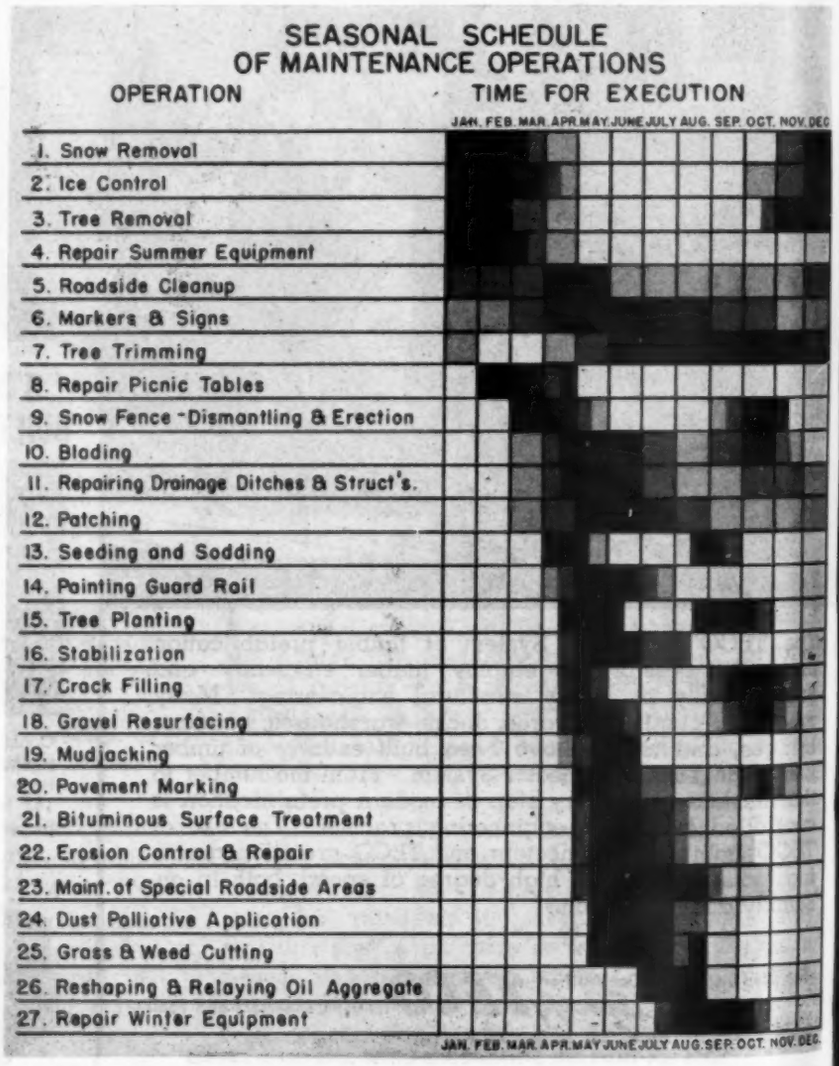
The J. W. Whiting Const. Co. is another example where the sons have stepped in and are carrying on what the father, J. W. Whiting started. They have the access road to the Tooele Ammunition Depot, the Kearns replacement center and Camp Williams.

And then there's H. T. Reynolds, who built Utah's first flight strip. (See page 64, this issue of ROADS AND STREETS.) He also has an access road to the Hill Field Air Depot and roads inside the area.

And Miner Brothers, who built the north access road to the Ogden Ordnance Depot.

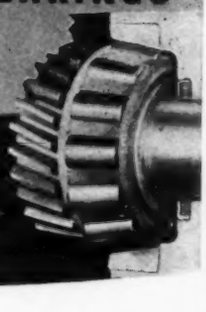
And B. D. Palfreyman, until recently a Springville contractor. Now at Provo a few miles away, he is graveling the roads for a local government housing project.

Quite a line-up for one small town.



Never a dull moment in the work of a highway department! This chart is taken from the Michigan State Highway Department's well-prepared manual, "Standard Procedure for Highway Maintenance"

TIMKEN ROLLER BEARINGS in a SINGLE CYLINDER ENGINE?



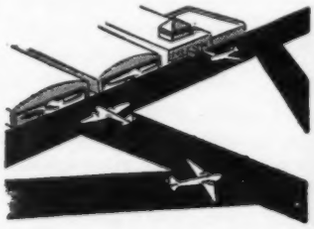
Certainly—if it's a **WISCONSIN AIR-COOLED ENGINE**

No Wisconsin Engine, so far as we know, has ever had a case of "Bearing Failure." Basically, this is an end result of using Timken Roller Bearings at both ends of the crankshaft. Normally, small engines are not provided with this safeguard . . . but every Wisconsin Engine, whether single cylinder or 4 Cyl.; 1 hp. or 35 hp., has this heavy-duty service protection. This is a typical example of Wisconsin Air-Cooled Heavy-Duty Engine design and construction . . . geared to maximum utilization of power-operated equipment.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

ASPHALT for AIRPORT RUNWAYS

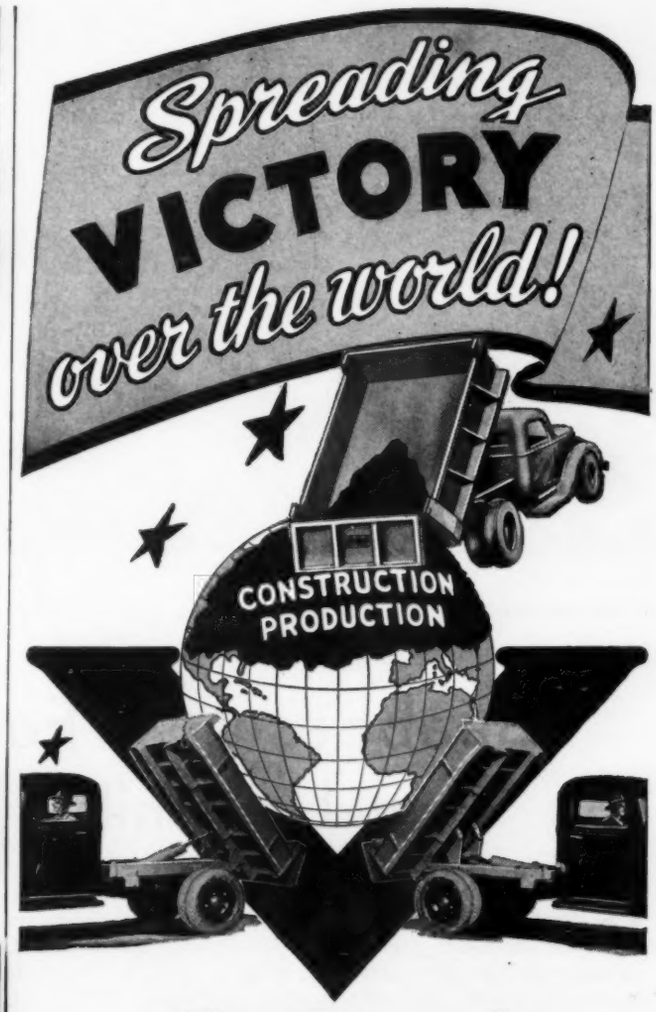


Adequate landing fields are urgently needed. Safe, all-weather Asphalt runways can be laid quickly. In most instances local material can be used, which further speeds up the work, and reduces the cost of Asphalt construction.

Airports built now for training and other war measures will also be an asset to your community after they are no longer needed for war.

Wherever Standard Oil Asphalt products are sold, there is an Asphalt Representative who can give you full information about these and other uses of Asphalt. Write . . .

STANDARD OIL COMPANY (Indiana)
910 SOUTH MICHIGAN AVENUE, CHICAGO



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HOISTS • BODIES TRUCK PATROLS

IN this fight all over the world, you'll find St.Paul Hydraulic Dump equipment building highways, air fields, army encampments—"spreading VICTORY" with our Army and our Allies.

Buy WAR BONDS

. . AND DO YOUR PART IN "SPREADING VICTORY"

ST.PAUL HYDRAULIC HOIST COMPANY
2207 UNIVERSITY AVENUE, S. E.
MINNEAPOLIS, MINNESOTA

Official U. S. Navy Photo

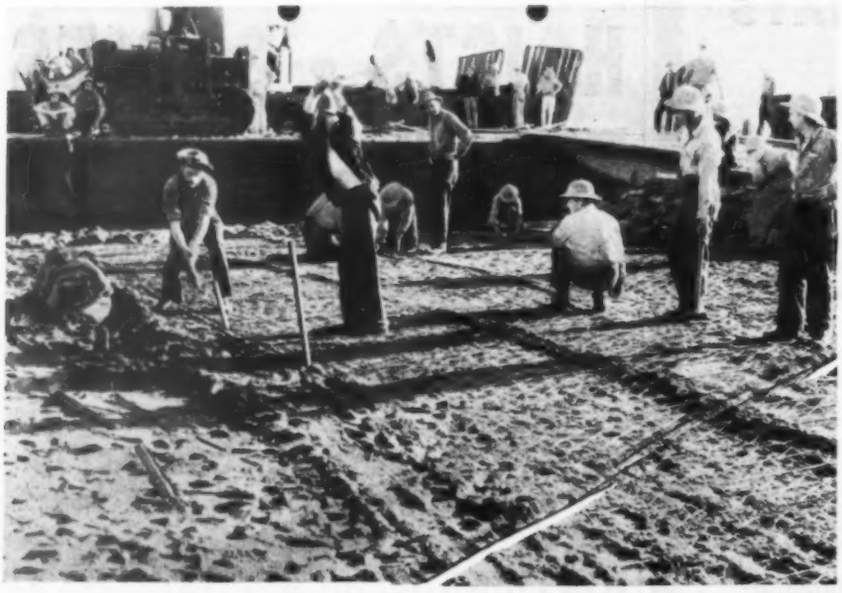
A little difficulty is encountered in the building of a jungle road. But it isn't as bad as it looks and the Seabees soon had everything under control again. All in a day's work for the Construction Battalions.

Seabees Use Familiar Equipment in Unfamiliar Surroundings

BEFORE Pearl Harbor the Navy Seabees personnel were building the roads, the airports, the skyscrapers, the railroads, and the thousands of other projects that are part of America. Today they are still doing the building—but at advance and mobile bases throughout the world that support the fleet on the surface, under the surface and in the air. And they're doing it with the same efficiency and thoroughness that characterized their work in civil life.

No job is too big or too tough for these hard-bitten construction men. Their motto is "Can Do"—and time after time, under all conditions, they have demonstrated that there is nothing they can't do. They have done everything—from repairing an aircraft carrier during battle to carving a landing strip out of a jungle in ten days' time. And they've done their share of fighting too—for they are trained to defend what they have built.

The Navy still is urgently in need of skilled tradesmen for service in the Seabees. Mechanics, carpenters, riggers, drillers, stevedores, steel workers, welders, electricians and many other skilled craftsmen between the ages of 17 and 50 can now volunteer for service. Salaries range from $54 to $126 a month plus 20 per cent for overseas duty, and include quarters, food, clothing, transportation, medical and dental care, and other incidentals to which enlisted personnel are entitled. There are also allowances for dependents. Full information may be secured at any Navy Recruiting Station.



Official U. S. Navy Photo

Steel wire mesh, giving the necessary stability for a road, is laid across a sandy beach from a wharf to a camp several hundred yards back from shore

W. Virginia Snow and Ice Program Cost $349,964 Last Winter

Snow removal and ice control on West Virginia's 38,000-mile highway system cost $349,964 during the past winter season, according to cost totals compiled recently by the Commission's Maintenance Division. Of this amount, $268,063 was expended on the primary and $81,901 on the secondary system.

OIL . . . from the Land of the Midnight Sun

The tractor-sleigh supply convoy followed the path shown above—from the railhead at Peace River, Alberta, to Norman Wells, N.W.T. — approximately 1,000 miles. The Canol oil pipeline extends from Fort Norman to Whitehorse, to connect with the Alcan Highway.

IN the frozen wilds near the Arctic Circle, a treasure of oil lay sleeping . . . serving man but little purpose. Construction of the Alaskan Highway lifeline brought it within easy piping and trucking distance of our armed outposts. But before the precious fluid could be started on its way, thousands of tons of supplies for drilling, pumping and transporting had to be hauled over mountain terrain through the bitter cold of an Arctic winter.

With the last railhead a thousand miles below . . . and roads non-existent or non-passable . . . moving the materials there was a job for tractors — tracklayers that travel where ordinary forms of mobile power cannot penetrate.

Working with contractors Bechtel-Price-Callahan, the U. S. Ordnance and the Corps of Engineers outfitted tractor-sleigh trains. Over a hundred Allis-Chalmers, 2-Cycle Diesel tractors took up the long trek northward. Days and nights on end they fought their way forward . . . in temperatures that reached 70 degrees below zero. Traveling in convoys of four trains each — a tractor to each train — they made a continuous parade over the snow-packed tractor trails — a parade without fanfare . . . grim, determined and successful! They and their brave band of operators delivered the goods!

118 ALLIS-CHALMERS, 2-CYCLE DIESEL TRACTORS, *with their cargo-laden sleighs of oil rigs, pumps, pipe, tools and other oil field supplies, have written history in the snows of Canada's Northwest Territories. Additional A-C tractors also served . . . on various construction phases of the project.*

• • •

In the days after the war, more trails will be broken . . . to new riches. Tractors will pioneer the way where man has never yet set foot. They will deliver the goods against all odds . . . play their part in releasing the abundance of materials we need to make this a better, happier life. New roads will open up a new world for all — new places to see, new friends to make, new products to enjoy.

ENLIST WITH THE "SEABEES"
SEABEES
INQUIRE AT ANY U.S. NAVY RECRUITING STATION
U.S. NAVY BUREAU OF WORKS AND DOCKS

NAVY

ALLIS-CHALMERS

TRACTOR DIVISION, MILWAUKEE, WIS., U. S. A.

Traffic Volume Trends

Preliminary summaries of automatic traffic recorder data for May 1943 indicate that decreases in traffic are nearly the same as those for February March, and April compared with corresponding month of 1942. This decrease applies to traffic on State as well as local highways.

The revised summary for April, 1943, which includes nearly a hundred more stations, shows a decrease of 29.6 per cent.

However, traffic has not remained constant in volume during these four months. Actually it has increased about 24 per cent in the East, and 19 per cent in the remainder of the country, from February to May, 1943.

Traffic in May 1943 in the Atlantic seaboard areas is 46 per cent of traffic in 1941; while in the remainder of the country it is 61 per cent of 1941.

Traffic at toll facilities shows considerably smaller percentages of decrease in May 1943 throughout all sections of the country than are found on rural highways of the Nation. Decreases in the area rationed in May 1942 generally are in excess of those in the remainder of the country.

Unusual floods in the Middle West greatly affected the traffic on the toll facilities.

In the area rationed on May 15, 1942, the May, 1942, commercial traffic was 18.6 per cent, and the May, 1943, 23.9 per cent of the total traffic. For the toll facilities in the area rationed on December 1, 1942, the comparable figures for commercial traffic in May, 1942, and 1943 were 13.5 per cent and 15.5 per cent respectively.

▼

We Want to Build—Not to Rebuild

(*Continued from page* 62)

cilities, hospitals, sanatoriums and public buildings. We must provide play grounds, public auditoriums, athletic fields and other facilities for greater enjoyment and relaxation.

Assuming that India, China and Russia, with their teeming millions, are lifted to a higher standard of living, our export trade will be multiplied hundreds of times. If each Indian and Chinese family had just one dollar of American money a day in income, the impact of that purchasing power on industry and agriculture would be of tremendous proportions. And this is the new world we are building.

The construction industry, primarily, is a building industry. It has had the courage and the daring to attempt every great project that man's imagination has conceived. It has never recognized any physical obstacle. Give it men, machinery and money and leveling the Rockies isn't beyond its possibilities.

So let's go forward with the idea of building and discard the thought of rebuilding. Let's build new with new machines and new visions.

While we are about it, let us not forget to build new concepts of government. This nation was not born to become a melting pot for theories of paternalism. It was born of a desire for freedom for the individual. Its greatness and its glory from an economic standpoint was built upon the private enterprise system. It has become the envy of the world from the standpoint of its living standards because men of courage and vision have risked their fortunes in new ventures. Any system of governmental control and regulation would destroy that and with it all we have built in the nearly two hundred years of struggle.

So we should build an impregnable wall about our system of private enterprise. It will take some new materials in the way of new labor relationships and plans for economic security and for the maintenance of consistent employment levels but private enterprise can build these too if unhampered by radical interference.

As an industry, we should adopt the idea of building rather than of rebuilding and in everything we do, carry this banner into all the places in the nation.

46 States Now Require Registration of Engineers

An act providing for the registration of professional engineers was passed by the 1943 North Dakota legislature and approved by the Governor. It went into effect on July 1. North Dakota is the 46th state to require registration of engineers.

The preparation, introduction and passage of the act resulted largely from efforts of the North Dakota Society of Professional Engineers, which was organized in 1940.

Governor John Moses has appointed Jay Wesley Bliss, City Manager, Minot; Alexander Carothers Burr, Consulting Engineer, Jamestown; and Clifford Johnson, Bridge Engineer, State Highway Department, Bismarck, to the three-member State Board of Registration for Professional Engineers.

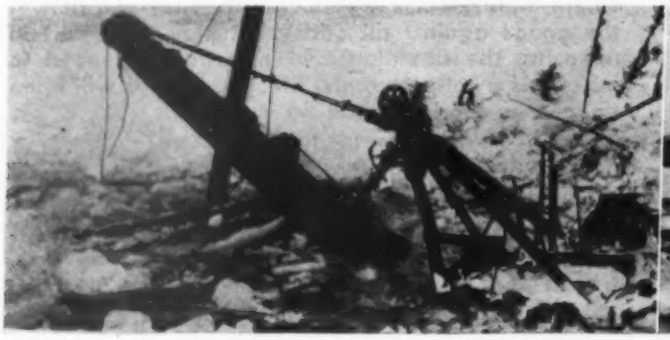
▼

Old Timer Survives Dunking

Honorably retired and turned out to pasture some time ago after a long and illustrious dirt-moving career, the 13-year-old Insley shovel pictured below recently proved to the construction crew of a Canadian public utility that "you cant' keep a good shovel down."

As related by J. Shepherd Lee, superintendent of the Tors Cove Development of the Newfoundland Light and Power Company, Ltd., this old shovel was brought out of retirement because of equipment scarcity and assigned to a project 17 miles from the equipment depot where it had been in storage. Moving under its own power, the shovel began the long trek over the barren, ice and snow-covered countryside.

A frozen lake was not equal to its weight, and suddenly down she went —right up to the dipper stick—and settled in the mud. One photo shows her "on the bottom." The other, the rescued machine out again, advancing under its own power with boom and bucket removed and mechanically none the worse for its dunking.



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WELLMAN

MULTIPLE ROPE AND POWER ARM • POWER WHEEL • DREDGING • STEEL MILL • DRAG-LINE BUCKETS

⅜ to 16½ yds. capacities

BUILT TO LAST-

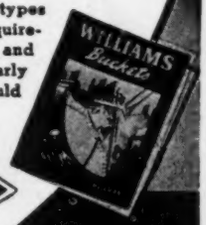
Welded Rolled Steel Construction Means Great Strength and Longer Wear!

and MOVE DIRT FAST!

Williams Buckets are balanced and designed for digging power and fast action. An operator can make time with a Williams Clamshell or Dragline.

THE WELLMAN ENGINEERING CO.
7003 Central Ave., Cleveland, O.

Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why your next bucket should be a Williams.



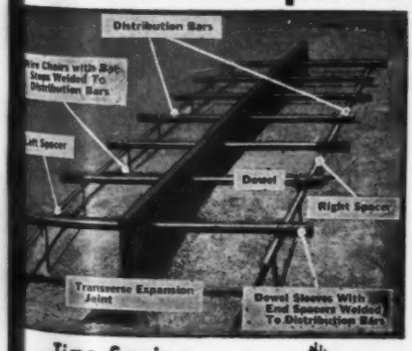
ARMY E NAVY

Build Better Runways

for the Birds of War!

Insure Substantial, Long-Lasting Concrete Runways and Aprons with

LACLEDE Welded Dowel Spacers



Time-Saving Accurate — Rigid Available Now!

LACLEDE

LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

ALL OUT FOR THE WAR EFFORT AND VICTORY!

BUT FULLY PREPARED TO MEET YOUR POST WAR PLANS

★ In Trojan equipment you will have machines that will make "after victory" contracts more successful. We are looking forward to the post war era when we can again take care of your normal requirements.

Trojan equipment includes GRADE RIPPERS —TAMPING ROLLERS—SHOULDER EXCAVATORS—SCRAPERS—MAINTAINERS—GRADERS—SNOW PLOWS

CONTRACTORS MACHINERY COMPANY, Inc.

BATAVIA, NEW YORK, U. S. A.

DOUBLE DUTY

The BURCH TRUCK PATROL will maintain roads and shoulders, clean drainage ditches and remove ice and slush from paved roads. It is not merely a scraping blade, but a cutting blade and thus will do more. It is HYDROMOTOR controlled and that means by a touch of the finger.

Manufactured by

The BURCH CORPORATION
Crestline, Ohio

Equipment since 1875

A.S.C.E. Adopts Post-War Committee Report

(*Continued from page* 47)

ing jobs at such periods as jobs are needed. Preparation of working plans, selection and cost-estimating of rights-of-way, and legal and financial work can and must be completed now.

Local Jobs Loom Large

Self-liquidating local projects which should be blue-printed *before* war's end include water reservoirs, purification and distribution systems, drainage and sewerage systems, street improvements giving access to private properties, toll bridges, express and limited-access highways and highway tunnels. Eighteen types of projects are listed as adaptable to "pay-as-you-go" financing.

Eleven major types of vital publicly financed projects ranging from schools to ordinary public streets and highways are given.

Highway and Street Deficiency

As an example of public works in which the federal government should continue to participate the committee cites the $3,600,000,000 estimated accumulated deficiency in highway and street work. These include modernization and rebuilding of trunk highways and urban connections; limited-access express highways, bypasses and belt lines in and around metropolitan centers; construction of many miles of inter-regional highways needed for national development; and extensive improvements on county and local roads.

This field is mentioned as presenting one of the chief opportunities for advance planning.

Local Works a Serious Question

Planning purely local public works presents serious problems and advance planning is lagging for this type of project. Making a paper list isn't enough. The vital question is not engineering talent but means of financing the preliminary work, and the real leaders in local post-war civic affairs are those who are busy now demonstrating the economic feasibility of needed new works and giving thought to avenues of raising revenues.

A revolving federal loan fund and safeguarded system of lending funds for preparing plans is a possible solution.

Federal public works, too, are needed, but these must have the criteria of practical utility, economic soundness and should be non-competitive with private enterprise.

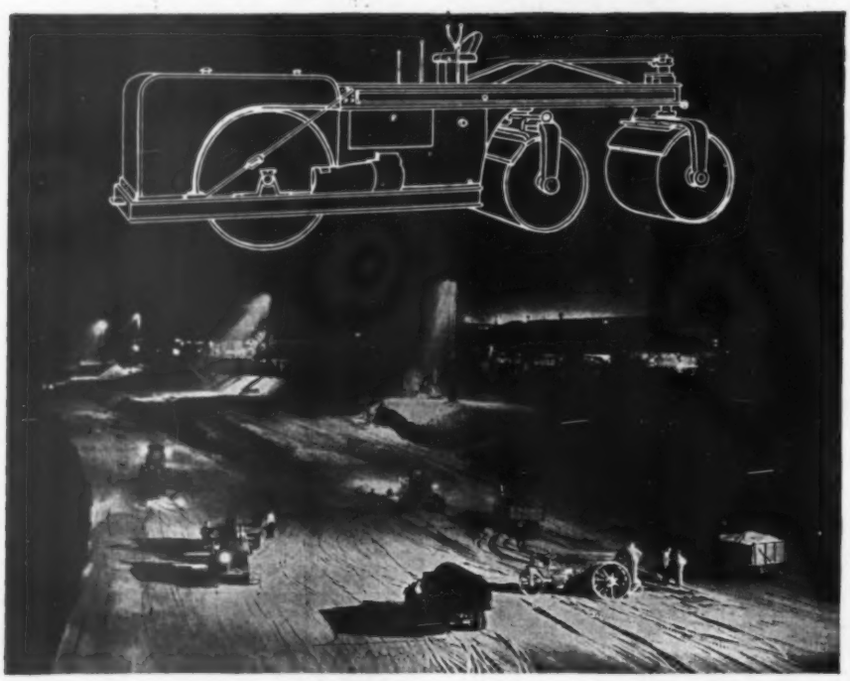
The Society's Committee on Post-War Construction, as previously reported in ROADS AND STREETS, comprises Adolph J. Ackerman, Dean G. Edwards, Frederick H. Fowler, Gustav J. Requardt, Frank T. Sheets, and G. Donald Kennedy, Chairman.

▼

Named State Highway Superintendent

J. G. Smith of Cheyenne, former construction engineer for the Wyoming state highway department, has been appointed state highway superintendent, succeeding the late C. F. Seifried who died suddenly on July 21 at Cody while on an inspection trip. Mr. Smith resigned his former post as construction engineer 18 months ago to enter the employ of the A. H. Read Construction Company of Cheyenne.

A member of the state highway department for approximately 20 years, Mr. Seifried was at the time of his death, the second oldest in continuous service. For a number of years he served as office engineer through the formative stages of Wyoming's highway system and was named superintendent of the department in 1937.



On Non-Stop Schedule to Win the War

That is the way the army is using Buffalo-Springfield rollers—on a non-stop road and runway building schedule.

Until the enemy strikes his flag, that is the exclusive Buffalo-Springfield job. The war over, Buffalo-Springfields in a full range of types and sizes will again be available for civilian construction.

The Buffalo-Springfield Roller Co., Springfield, Ohio

BUFFALO-SPRINGFIELD

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Care and Repair in Shop and Field

CONSTRUCTION EQUIPMENT MAINTENANCE

A SPECIAL SECTION OF ROADS & STREETS

Clipper pilots have extra eyes

To assist in making night-time landings at the far-flung marine and land bases of Pan American World Airways, every Clipper captain has several "extra eyes"... radio, navigation, wing lights — and a piercing, dependable beacon light.

The big Diesel generators that pump power to these street lamps of the sky are the Clipper stations' nerve centers. They supply electricity for work shops, kitchens and living quarters — as well as illumination. They must be kept going at top efficiency night and day. To make sure they do, Pan American lubricates its Diesels with RPM DELO.

RPM DELO frequently doubles the time between Diesel overhauls. It ends ring-sticking, protects bearings against corrosion, cuts ring and liner wear to the thinnest minimum. No other lubricating oil gives your Diesels the protection they get from RPM DELO — because no other compounded oil combines its ring-cleaning, non-corrosive and anti-oxidant properties.

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under these names:

RPM DELO
Caltex RPM DELO
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CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

STANDARD OIL COMPANY OF CALIFORNIA

Equipment Maintenance

"We Grease 'Em and No Foolin'"

How Megarry Brothers keep their airport outfit geared up with a positive servicing routine and modern field repair shop

By HAROLD J. McKEEVER
Associate Editor, Roads and Streets

"YOU can eat off the concrete floor," is a good way to begin telling about the field shop of Megarry Brothers, of St. Cloud, Minn., who have the grading and paving contract for constructing an airport at Alexandria, Minn., under direction of the Civil Aeronautics Administration. This well-equipped, everything-in-its-place equipment hospital is typical of the slick outfit which the Megarrys usually put on a job.

Always known as a firm which has built success around a policy of operating only modern equipment and almost fanatically keeping it in good condition, this firm has stuck doggedly to its equipment policies in spite of wartime difficulties. "We've always found that a first-class field repair shop and an airtight servicing and inspection routine paid out very well, and today they're absolute necessities," explained Charles Megarry of the contracting firm.

Before going into details of their machinery maintenance, it will help to take a quick look at the job in general and the outfit assembled here. The airport, one of several in the current CAA development program in the Northwest, is being built on municipally-furnished land, site of a partly graded emergency field.

The current project consists of grading four 150-ft. paved runways 4,800 to 5,700 ft. in length, with 250-ft. berms; and completion of two runway surfaces now, top soil being replaced for future paving of the other two. Runways, designed for 37,000 lb. wheel loading, consist of 10 inches of stabilized clay-gravel, tack coat, 2 inches of hot-laid plant-mix, seal and chips. The site is underlain by sand-gravel subsoil ideal for runway sub-base.

Contract bid items include 977,000 cu. yd. excavation, which involves numerous irregular cut-fill balance areas with little outside borrow (901,200 cu. yd. cut, 727,000 cu. yd. fill with estimated 19.3% shrinkage, 76,500 cu. yd. silt removal); 10,000,000 gal. water for moisture control during fill compaction; 222,000 sq. yd. of 10-in. stabilized base; 88,890 gal. MC-O prime coat; 222,180 sq. yd. of 2-in. top mix; 444,000 gal. asphaltic cement (120-150 pen.) for hot-mix; 44,400 gal. RC-2 seal coat; 2,200 tons sand or chip aggregate; 3,400 lin. ft. concrete drainage pipe, 12 to 18 in.; 5 corrugated perforated iron sumps, 36-in. diam. x 10 ft.; 1,500 rods of 2-wire electrical fence; 3,800 lin. ft. of 3-in. underground cable duct encased in concrete; 190 acres of fertilizing and 400 acres of seeding.

To handle this project the Megarrys assembled the following outfit, which includes some equipment owned by William Collins and Co., Fargo, S. Dak., road contractors.

Grading and Sub-Base

20 heavy diesel tractors
16 power control units
4 medium diesel tractors
2 light farm tractors
4 1,500-gal. sprinkler trucks
15 scrapers, 9 to 18 yd.
6 sheepsfoot roller units (1 single, 4 double, 1 triple)

The noon line up for greasing on Megarry's airport job at Alexandria, Minn.

Charles Megarry (right), his son, and shop foreman, Art. J. Maus

6 bulldozer aprong (3 to 6 in. use)
4 push blocks
4 heavy diesel patrol graders
2 spring-tooth harrows
1 disc barrow
10,000 gallon water storage tank with 2-in. pipe line to nearby lake

Paving

1 asphalt paver
10 two-ton trucks
1 pneumatic roller (8-ton)
2 heavy asphalt rollers

Miscellaneous

5 portable light plants
5 water pumps
1 greasing truck, compressor equipped
1 portable arc-welder
1 ⅝-yd. dragline (for drainage pipe)
1 mechanical broom

Hot-Mix and Stabilize Plant

150-ton-per-hour asphalt hot-mix plant, including
portable crushing plant
portable screening plant
two belt conveyors for clay and gravel
diesel light plant
timber scraper dump

Grease and Oil Routine

Megarry Brothers' equipment servicing routine follows latest efficiency practice in that every machine positively gets looked over every 24 hours or oftener. This daily chore centers around a large compressor-equipped grease truck with three reels of grease-line hose operated by three top flight service men (who incidentally won't let any novices work with them or let anyone climb around their truck, by golly). The greasing crew has a definite daily work docket which depends on the shift line-up, outfit working and other variables. It catches bulldozers and other smaller units, sometimes including the 9-10-yd. scraper units, whenever the operators can snatch a few minutes to pull by for greasing.

Photo and diagram showing double line of tractor-scraper units, which facilitates retanking and greasing during noon or 6-p.m. meal stop

But the 13, 15 and 18-yd. scraper units, and often other equipment, are greased and re-fueled between shifts when running three 8-hr. shifts, or at noon and 6 p. m. when running two 10½-hour shifts. At greasing time operators are instructed to pull their machines into two parallel lines of 3 units each, as shown in diagram, leaving a path between lines for fuel trucks. The long grease hose from the truck enable the greasers to reach all six units from one truck position.

Report Forms Aid Check-Up

The daily doings of the grease truck as well as all other servicing and field repair work and materials and parts used, are translated into central-office intelligence by means of four form sheets, as follows:

1. *Mechanics' Daily Reports.*—These show the nature of all work done, labor time, machines involved, each machine of course having a bookkeeping number.

2. *Daily Equipment Repair Record*—to which data from sheet No. 1 are transferred, taking off labor and parts costs for bookkeeping and assigning cost charges against each machine.

3. *Daily Grease Report*—filled out by each service man or crew, showing machines serviced and nature of service, whether oil, grease, gas for starting motor; also check-up on rollers, clutch fittings, transmission, final drives.

4. *Oil Change Time-Record.*—Kept by the shop superintendent or an assistant, this sheet is the "eagle eye" of the job. On it is entered each machine on the project, and the work-time interval at which this unit should have crank-case and oil-filter change (200 hours, 120, 80 or other assigned period, depending on age or condition of machine). On this sheet each operating day are entered the daily accumulative hours of work time since the last oil change.

Red check marks are made to indicate dates on which greasing was performed—another quick visual check. Green-crayon "C" marks show when oil change took place. These reports aren't just sheets of paper or "something that somebody is supposed to keep up." With the Megarry Bros. organization, they are *kept* up and *followed* up to see that manufacturers' greasing, oiling and servicing recommendations are followed, plus.

Field Repair Shop

The field repair shop consists of a concrete-floored building, 32 x 90 ft., divided into an 18-ft. stock room and a 72-ft. repair room having two doors and service lanes. Arranged compactly along one side wall and the back wall are a lathe with 8-ft. bed, grinder, small drill press, a 90-ton press (used mostly for pressing off ring gears), and work benches. Also on hand are 2 portable grinders, shop arc welder, 3 acetylene welding outfits, small forge, automatic compressor, battery charger and small tools.

Tools, tires, and all replacement parts except nuts, bolts, and other frequently used items are stored in the adjoining stock room which also is the shop office.

Of special interest in the main shop room is a home-made heavy-duty chain hoist frame, whose overhead rail is carried "saw horse" style on long A-frames fitted with large castor wheels. Perhaps the most valuable single piece of equipment in the shop, this crane is strong enough to handle tractor engines. It is simply constructed of iron tubing, I-beams and angle sections.

A minimum of one welder and two mechanics are employed on each shift. Sometimes more. Although Megarry Bros. try to get their overhauling done in off months, this year their field shop has had to perform a continual succession of engine overhauls and special heavy repair jobs. Tractors are taken to the headquarters

Teeth that roll . . .

AN IMPORTANT REASON FOR STEERING EXCELLENCE

IN GEMMER STEERING

There are no sliding contacts between gear teeth in the Gemmer Steering Gear. The hourglass worm bears on *teeth that roll*—providing highest efficiency – smooth, easy transfer of power.

Supporting this basic design value are many other superior qualities such as:

SIMPLICITY—just a few parts—nothing complex—nothing to get out of order or require frequent adjustment.

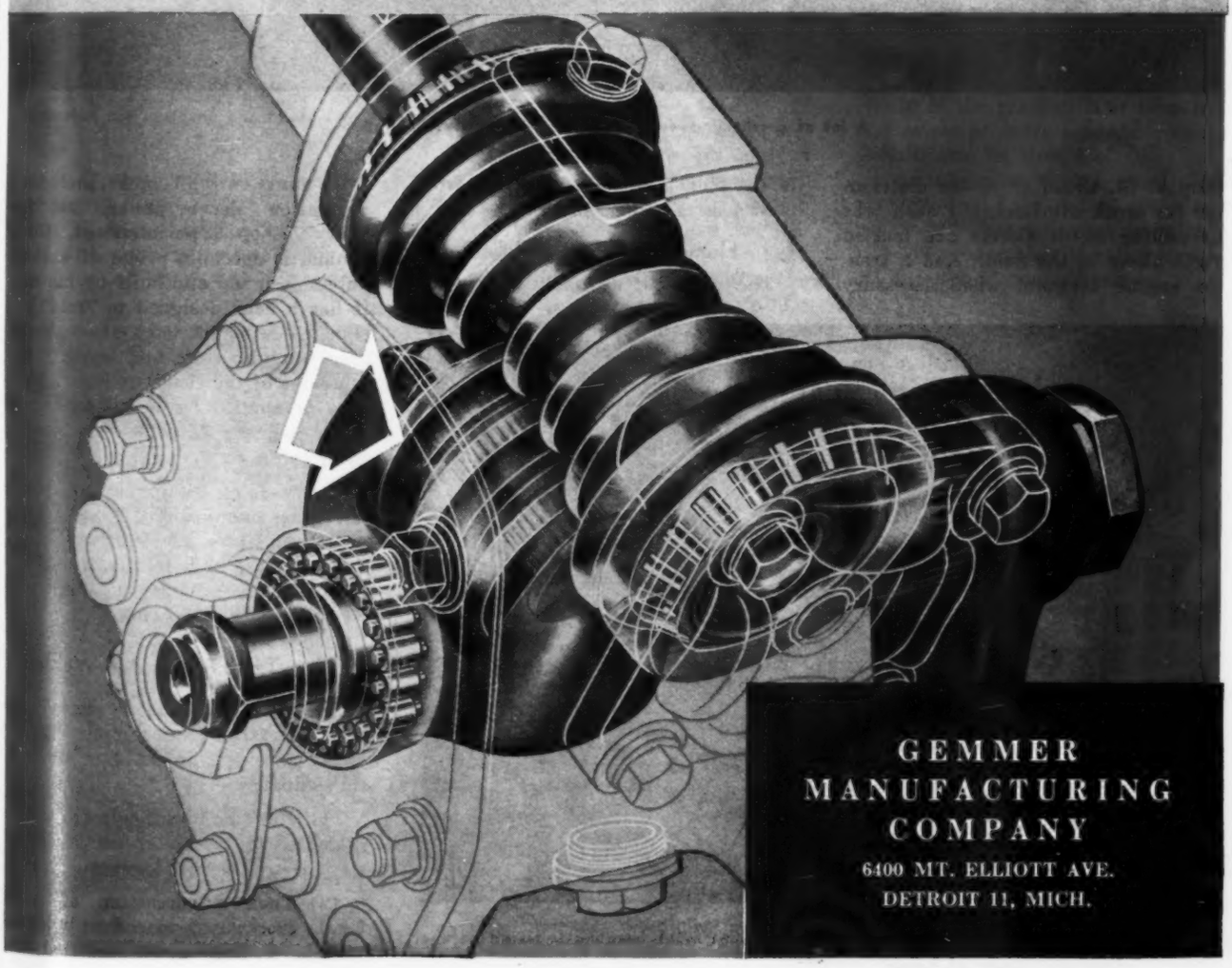
STABILITY—Inherent design banishes "lost motion" and reduces wear to the least possible minimum. Steering is always firm, responsive, positive with absence of rubbery feeling and wander.

STURDY—COMPACT—The close coupled design provides exceptional compactness—ease of installation—saving of weight without sacrifice of overall capacity or steering arm angularity. Solid steel forgings provide abundant strength, durability—ample safety factor—internal stresses are low.

ANTIFRICTION BEARINGS at all critical points—particularly important to efficiency where motion is relatively slow.

Gemmer Steering is demonstrating its worth in every type of automotive vehicle from the lightest passenger cars to the heaviest buses and trucks—in the road-building machinery, agricultural tractor and marine fields.

GEMMER—PIONEER OF HIGH EFFICIENCY STEERING



GEMMER
MANUFACTURING
COMPANY
6400 MT. ELLIOTT AVE.
DETROIT 11, MICH.

A lot of overhauling went on inside this spacious field shop

shop at St. Cloud or to the distributor for track overhaul, but such jobs as pulling motor sleeves are tackled right along in the field. And a tractor engine overhaul when necessary in the field is "knocked out" in from 2 to 4 days and nights.

Home-Made Sleeve Puller

The complete assembly of tractor tools hung on wall racks includes a regulation sleeve puller, but Megarry's shop superintendent, Oliver Bluhm, is specially proud of a sleeve puller designed and built by his men. It has a head designed to "fold" and slide sideways through the cylinder, then straighten out and grip the bottom edge of the sleeve cylinder. Pressure is applied by turning a screw, using a piece of wrecking bar for hand leverage.

Demountable wall bins for parts, corner-reinforced against rough handling in transit between jobs

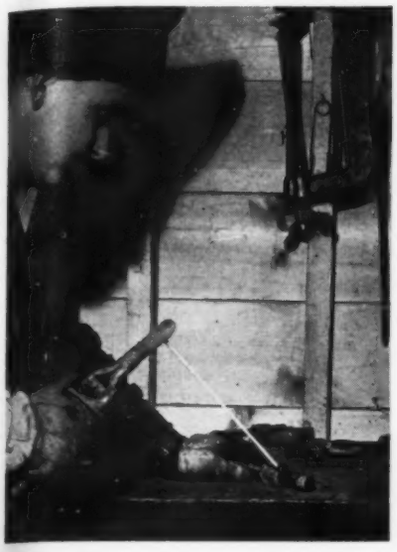
The welding equipment of course has been increasingly busy. Track rollers and pins are built up here in spare hours, to help the home shop keep abreast of this important and continuing salvage task.

How Truck Rollers Are Welded

Shown in the photo on page 79 are the successive passes made by Megarry's welders in building up tractor rollers:

(1) First he lays beads around the diameter of the roller surface to fill any deep grooves or scorings.

(2) Then a succession of single beads crossways, spaced at wide intervals to keep down localized heat



Welding to build up worn pins. Lower photo shows a pin after the weld and a companion pin reground and ready for use

(especially important if bronze bushings aren't removed).

(3) Next he widens each cross weld with additional cross beads, one panel at a time, until the entire track surface has been built up.

(4) Finally he covers the entire surface with a second layer of beads, this time working around the circumference instead of crossways.

The rollers are ground, using a special stand set up to hold rollers against the emery wheel. Megarry Bros. don't believe it is necessary however to grind the rollers too accurately. Just the high spots.

Demountable Parts Bins

At first glance the parts bins along the shop wall look like they were built with the building. But they are merely tacked against the wall. Equipped with sheet metal corner reinforcements, these bins can be quickly knocked loose and piled into trucks at moving time for setting up again elsewhere.

Men On the Job

The foregoing project was designed and supervised by the Civil Aeronautics Administration, Airways Engineering Branch, Third Region Office, Chicago.

▼

Don't Let Up on Tire Care!

An avalanche of advice and warning on tire maintenance followed immediately in the wake of the first rubber restriction.

Then came a lull in this barrage.

Today most fleet owners are as vigilant as ever. But a few have shown signs of laxity, in the opinion of your traveling editor. So it's with no apologies at all that we publish the following excerpts from the brochure, *"Tire Hints for More Mileage,"* issued by the Customer Research Staff of General Motors.

Nothing new—but a condensation of the best that's been said.

1. Watch your tire inflation. *Really* watch it, and see that every driver does it all the time. Five pounds under-inflation means 32% less tire life; six pounds under, 38% less; nine pounds under, 52% less (this for passenger cars).

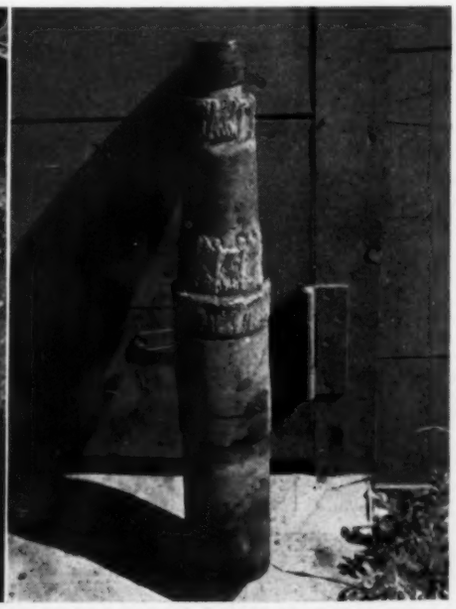
Over-inflation means excess wear at the center of the tread, easier bruising, more skidding.

2. Keep brakes adjusted, so all wheels take hold together.
3. Keep valve caps on.
4. Keep 'em rotating, every 4,000 to 5,000 miles.
5. Demount tires and check casings frequently for bruises, breaks, etc. (Do it when rotating.)
6. Avoid "jackrabbit starts" and quick stops.
7. Make slow turns. Check pressures if tires squeal on turns.
8. Check front wheel alignment every 5,000 miles.

And from an experienced and careful truck driver comes some advice on watching tire pressures during long hauls. On the road tires are sure to build up pressure under generated tire heat. Don't "bleed" them during the run, as this often merely results in the generation of more heat and raises pressure again. Stop occasionally and let tires cool.

And remember that a wheel that's toed one-half inch out of line drags its tire 87 feet sideways in a mile. Lots of good rubber is being scraped off because of poor alignment.

How Megarry's welders build up track rollers. (See text for description of the various stages illustrated here)



Another field-shop welding build-up job—wheel spindle of a scraper, ready to be turned to original dimension

Keep It Clean!

Dirt and other things to watch when installing motor bearings

THE following reminders are published by The Texas Company's magazine, *Lubrication*, as an aid to careful and accurate installation of motor bearings.

Why Bearings Fail

Almost all failures of bearings can be attributed to some factor which caused overheating. It is heat which causes the gases in the cylinder to expand and do useful work on the piston. It is also heat which destroys bearings. In the combustion chamber, the heat not utilized for doing work on the piston is rejected to the cooling water and to the exhaust gases. These mediums for taking away excess heat are flexible. In reality they constitute a "Safety Valve" to prevent overheating. In a bearing, there is no such "Safety Valve" for heat. The amount of heat that can be carried away by the oil circulating through the bearing and by other means is limited. Whether the bearing sizes or scores can be traced to some factor which causes overheating.

Thus the problem of correct replacement of precision bearings becomes one of not doing anything that may cause excessive bearing temperatures. Fundamentally, there are only two causes of excessive bearing temperature and these causes are interrelated:

(a) Friction, and

(b) Insufficient oil.

It must be remembered that the oil acts not only as a lubricant but also as a coolant. If for any reason the supply of oil to a bearing is reduced, less heat is carried away from the bearing and its temperature will rise. There are many factors in installation which affect the subsequent bearing friction and accelerate bearing failure; the following list contains only some of the more important ones:

1. Dirt
2. Insufficient or excessive clearance
3. Misalignment
4. Improper fit of bearings in crankcase saddle bores or caps
5. Out-of-round, scored or worn journals

Dirt, a Lurking Enemy

Precision bearings and the caps and saddle bores into which they fit are machined to very close tolerances. With bearing linings 0.002 to 0.005 inches thick and with journal to bearing clearances 0.0015 to 0.0035, a matter of a few ten thousandths of an inch becomes important. The life of the bearing in service will depend on how well these clearances can be maintained. Thus during fitting or bearing replacement, misalignment on the order of 0.0005 to 0.0010 or reductions in clearance of the same magnitude may be serious.

Dirt is perhaps the greatest enemy of bearings. Engine manufacturers install oil filters and air filters on engines to keep dirt out of engines because they realize that the life of engines can be materially increased if dirt is kept out. A few simple precautions necessary to keep dirt out of engines during bearing replacement never constitutes too high a price to pay for increased bearing and engine life.

Although the clearance of a bearing may be 0.0015 to 0.0035 inches under static conditions, in operation the clearance in one portion of a bearing is materially reduced and the oil film thickness may be as low as 0.0001 inch. This is illustrated in Figure 1 which shows the position assumed by a rotating shaft in a bearing. Even extremely minute particles of dirt in the oil will not pass through the point

(*Continued on page* 83)

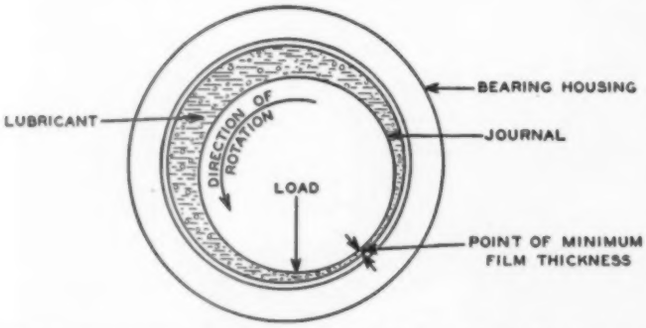


Fig. 1—Showing the position assumed by a rotating shaft in a bearing

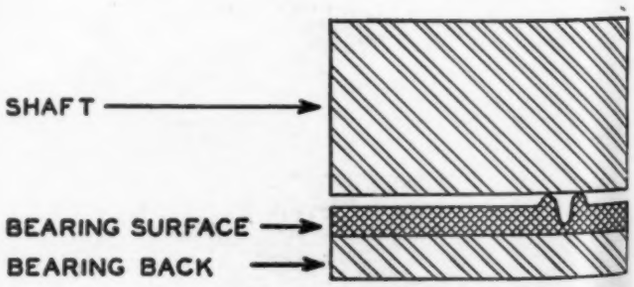
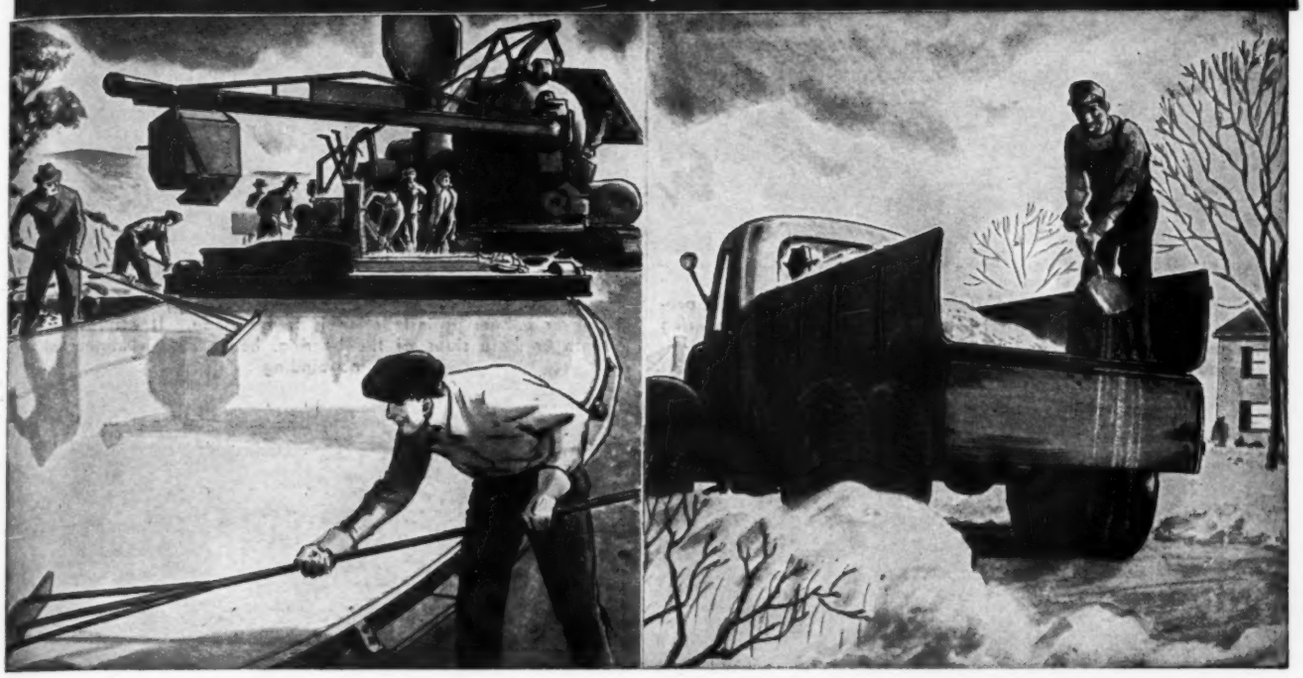


Fig. 2—Showing on an exaggerated scale how a particle of foreign matter thicker than the oil film can scratch or score the bearing surface

FAST! DURABLE!



Laid to stay SMOOTH!

CONTRACTORS AND ENGINEERS report success with Vinsol-treated cement on a variety of jobs, including highways, aprons, and taxiing surfaces at airports, as well as in foundation work and slip-on construction.

VINSOL*-TREATED CEMENT RESISTS SCALING

Tests Demonstrate Value

Here is a development you'll want to keep in mind. Experiences over the last 5 years show that the use of Vinsol-treated cement not only eliminates virtually all danger of scaling, but also saves time and money.

A typical report from a northern city states that Vinsol-treated cement laid side by side with normal portland cement showed no signs of scaling in spite of exposure to constant freezing, thawing, and the action of de-icing agents. On the other hand, the normal portland scaled right up to the joint separating the two surfaces.

Saves Time and Money in Laying

In addition, reports record many other advantages. Vinsol-treated cement, for example, is more workable—less subject to bleeding or segregation. Consequently, time and money are saved in spreading and finishing.

See Your Supplier

Chances are your supplier has Vinsol-treated cement, together with full instructions on its use. We have published a 44-page booklet, "Better Roads Ahead," in which practical authorities tell of their experiences. Mail the coupon today for your copy.

*Reg. U. S. Pat. Off.

Specify Vinsol-treated Cement for Longer Surface Life

NAVAL STORES DEPARTMENT
HERCULES POWDER COMPANY
INCORPORATED
972 MARKET STREET, WILMINGTON, DELAWARE

Gentlemen:
Please send me a copy of 44-page book, Better Roads Ahead, telling the complete story of Vinsol-treated cement.

Name_____
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Address_____
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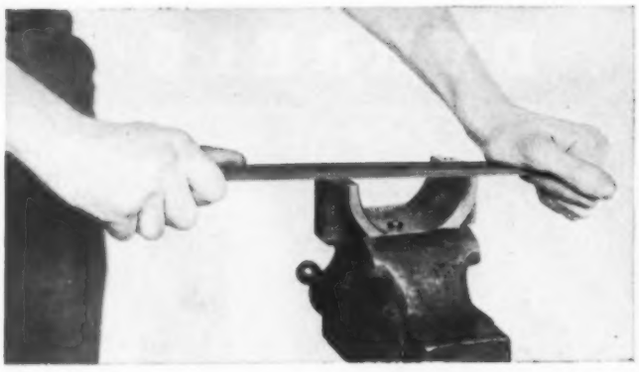
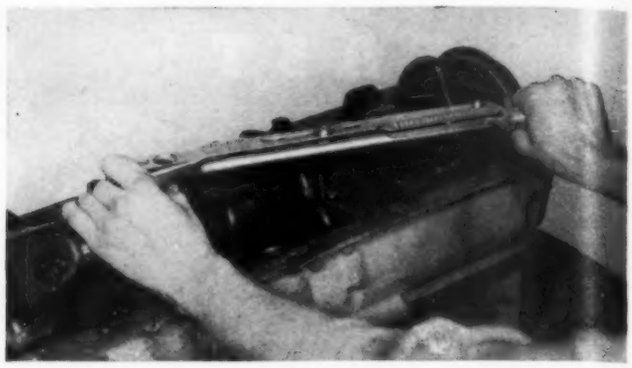
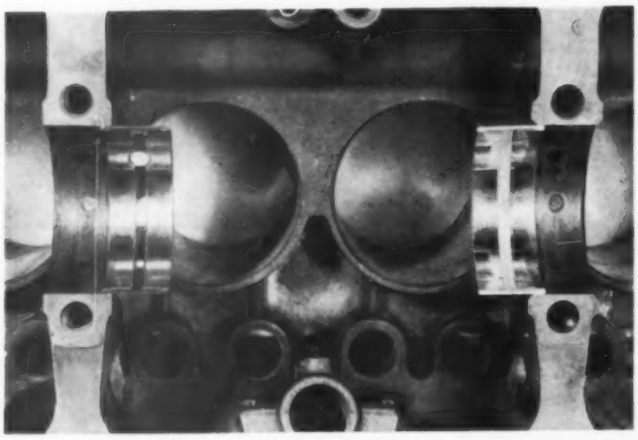


Filing Bearing Cup Contact Surfaces. Never resort to this procedure to adjust a precision insert bearing. It can reduce the bearing life, cause the crankcase and bearing cap bore to become out-of-round and complicate the installation of new bearings



Use of the torque wrench. This valuable tool is recommended whenever a bearing installation is to be made. It assures of even tension on both sides of the bearing, hence proper alignment and no binding



Oil holes must coincide. Make sure that the oil holes in the bearings coincide with the oil holes in the crankcase saddle bores, or with the holes in the connecting rods. A lower bearing half where the upper half should be is fatal to lubrication

Bearing spread. Most split bearings are made slightly wider across the open ends than the diameter of the crankcase or connecting rod bore for which they are intended. This enables the bearings to be snapped into position, and to remain seated should the caps be handled so that they might otherwise drop out. Spread can be changed by resting the bearing on a wooden block and tapping lightly on the back or side with a wooden mallet

Summary of General Bearing Precautions

The general procedure should be followed when installing new bearings can well be detailed according to the precautions which should be taken, viz.:

Dirt. The utmost care should be taken to clean thoroughly all parts before assembly.

Inspect for burrs. The presence of burrs on bearings, caps or rods can cause bearings to seat improperly.

Lip on Bearing. Each bearing lip must nest snugly in its companion slot in the bearing cap, connecting rod or crankcase.

Misplacement of Bearings. Be sure that bearing caps are not misplaced. It is possible to cause considerable trouble by faulty placement of bearings, either endwise or sidewise.

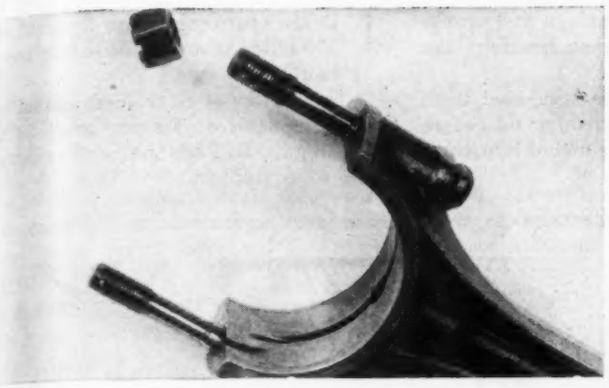
Cap Adjustment. Bearing caps must be properly centralized. Good procedure is to bolt lightly, tap gently on crown to obtain even centralizing. Then take up on tightening bolts evenly.

Use of Shim Stock. Do not use shim stock to increase bearing height or to reduce clearances due to a worn bearing. Placing of shim stock between the shell and back of a bearing for this purpose can cause air pockets which will interfere with heat transfer and cause bearings to overheat.

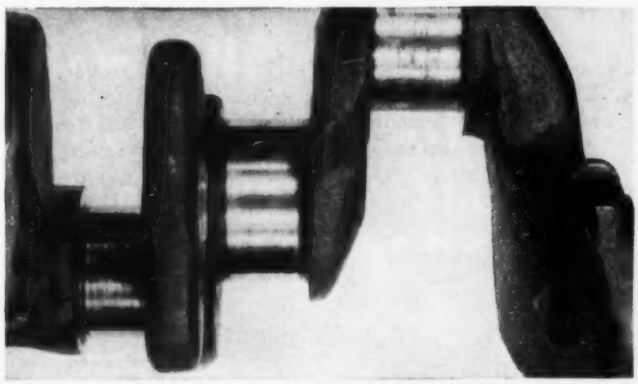
Oil a Newly Installed Bearing with SAE 50 oil. The added viscosity will retard leakage until the oil pump delivers its regular supply to the bearing.

Misalignment. Always a serious condition. When it is found, a major engine overhaul job should be done.

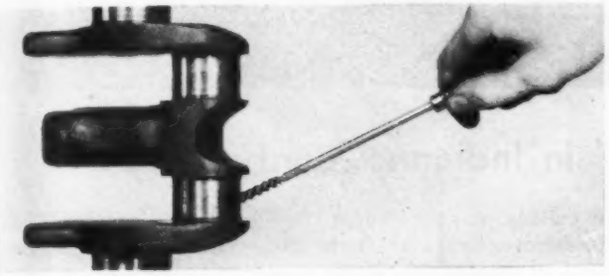
Replace Both Bearings, never only just one-half. Use new halves and be sure that the bearing is round (within the 0.005 to 0.020 inch allowable tolerance for spread).



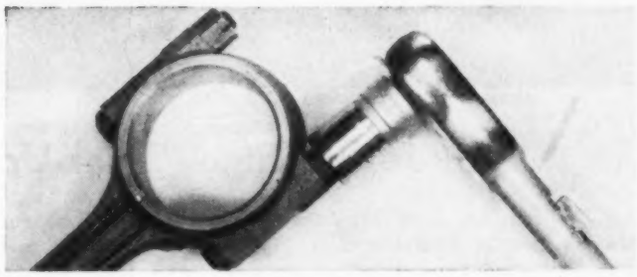
Burred Connecting Rod Bolts. Results from careless handling. Burrs prevent proper tightening with a torque wrench



Crankshaft should not be rough. A rough crankshaft will reduce the load carrying capacity of the bearing. Accordingly a rough shaft or pin surface should be re-finished and lapped



Crankshaft cleaning. This is very important when the engine is down for overhaul. All oilways should be swabbed and flushed to remove any obstructions. Use flushing oil or kerosene and a fine wire brush



Do not use a heavy-walled socket which does not go all the way down on the nut

Keep It Clean!

(*Continued from page* 80)

of minimum film thickness without acting as a lapping medium on both the journal and shaft. Particles larger than the thickness of the oil film either pass through the bearing, leaving a deep scratch as shown in or become imbedded in the bearing surface. In either event damage is done.

Under load, the small protuberance on the bearing surface resulting from deep scratches or dirt imbedment will rub against the shaft and heat will be generated. This heat will cause a rise in temperature of both the bearing and the oil film. As a result, the bearing film thickness which depends on viscosity will decrease, more protuberances and high spots will contact the shaft and, if the cycle of events proceeds far enough, the oil film becomes so thin that metal-to-metal contact will occur generally over a large portion of the bearing and temperatures will rise excessively, eventually resulting in "burning out" of the bearing.

Even should the conditions not be so severe as to cause bearing failure as described above, the high "spot" temperatures in and adjacent to the protuberance will accelerate fatigue failure of the bearing. Small cracks will develop in the bearing adjacent to the protuberance, and gradually the varying oil pressure will loosen a small section of babbitt. This small section of babbitt, no longer bonded to the back, rubs against the shaft and because it cannot dissipate heat through the bearing back for lack of good contact, it eventually disintegrates. The disintegrated particles are then carried through the bearing so that the entire process of scratching and imbedment is repeated.

Anything which interferes with the heat disssipation of a bearing has an effect on the resultant performance. It is common to find bearings assembled with particles of dirt between the bearing back and crankcase or connecting rod bore. The effect of a particle of dirt in such a location is illustrated in Fig. 3. A section of the bearing is deflected from the bore and consequently heat transfer through this section is retarded, thus resulting in increased temperature at a small section of the bearing surface. To further aggravate this situation, the bearing is no longer round and the shaft will bear on the high spot which will further increase the temperature at this particular location. The final result is similar to that previously described for scratches and dirt imbedments—shortened bearing life.

Double Check These Points

To avoid these troubles, it is merely necessary to keep dirt out of engines during overhaul. Adhering to the following practices will go a long way towards preventing troubles from dirt, viz.:

1. Keep work benches, tools and machine equipment clean.
2. Wash all parts possible with kerosene or a solvent or use a suitable degreasing outfit.

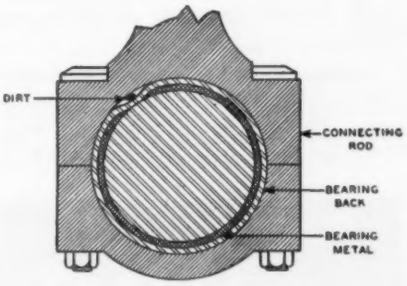
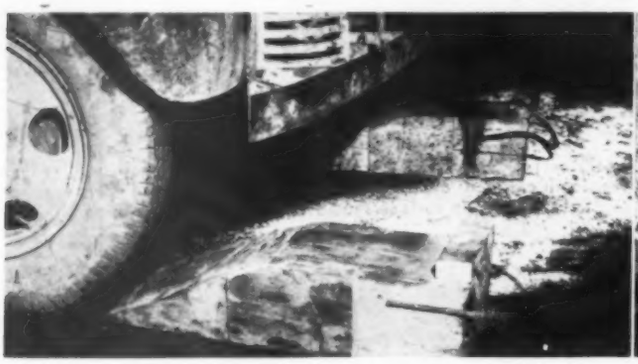
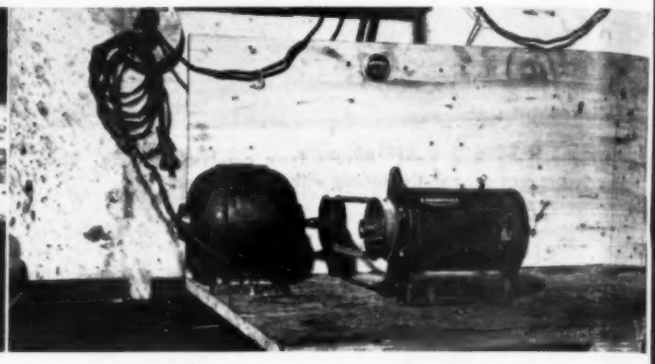


Fig. 3—Showing how a particle of dirt larger than the thickness of the oil film can become imbedded between the bearing back and connecting rod bore

3. Clean crankshaft oilways with a small brush and kerosene or solvent.
4. Thoroughly clean cylinder block after valve grinding, cylinder grinding or honing operations.
5. Make certain bearings and crankpins are clean when bearings are installed.
6. After the engine is assembled, flush with a suitable flushing oil before charging with the nomal lubricant.
7. Drain crankcase after first 200 or 300 miles of operation after overhaul.

The matter of cleanliness cannot be over-emphasized. Proper practices in this regard will add many miles to the life of equipment.





Three Wartime "Think-Ups" in Indiana County Shop

1. When the shop crew of the Marion County (Indianapolis) highway department got tired squeezing under their trucks to get at the crankcase pans, they took a few minutes out ont rainy day and built the block shown above (left). They make a big difference in work rooms where there's no lift or pit.

The serviceable test bench (left, below) was made from old iron and parts. The motor block to be worked on is fastened between revolving brackets as shown in sketch. The block is oriented to the desired position by means of a housed worm gear (A), taken from the blade-raising assembly of a worn-out grader. A hand wrench does the turning, as shown.

Besides holding motors during overhaul, this outfit is used as a stand for overhauled motors while breaking them in. Marion County's practice is to run 10 gallons of gas through each motor to discover kinks and bring bearings to a good fit. Cooling water from a 55-gal. drum is pumped (recirculated) through the block during the test.

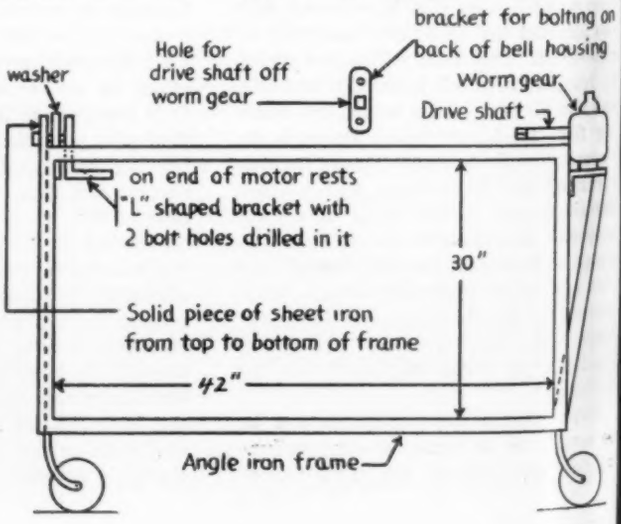
3. Crude looking and stripped to barest essentials, the generator test bench (right, above) nevertheless does a good job. Just an ordinary motor, a bracket on which to bolt the unit to be tested, a piece of V-belt, and an ammeter.

Robert R. Fisher is Marion County, Indiana, highway supervisor.

Home Made Snow Loader

The municipal garage men at Madison, Wis., under superintendent Martin Kennedy, reinforced their snow removal equipment last winter by improvising a loader out of parts from other units. The strange-looking device is reminiscent of a silo filler because it utilizes the blower from one. The motor, which came from a cement mixer, is hooked up by means of V-belt and pulley shaft.

The frame is shop-made. Springs, from an old car. Front axle, from a Ford V-8. Some fancy sheet metal work completed the unit, which was used principally on skating ponds and park winter recreation areas.



Three Home-Made Sleeve Pullers

Just because sleeve puller equipment isn't always to be had from the factory these days is no sign that cylinder sleeves no longer need removal or replacement. Probably there never was such an epidemic of tractor and truck motor overhaul jobs involving this step as today.

Your editor ran across three shop-manufactured puller devices recently. At Madison, Wis., the Dane County shop crew, noted for its wartime ingenuity (ROADS AND STREETS, October, 1942, pp. 70 to 72, July, 1943, p. 71), built the puller shown in Fig. 1. Utilizing a salvaged

Fig. 1. Home-made hydraulic ram operated puller, Dane County, Wisconsin, for RD8 Caterpillars.

hydraulic ram unit for power, this puller is designed for use in overhauling RD8 Caterpillars.

Also meant for use on heavy tractors is the somewhat different hand-operated design worked out by the field

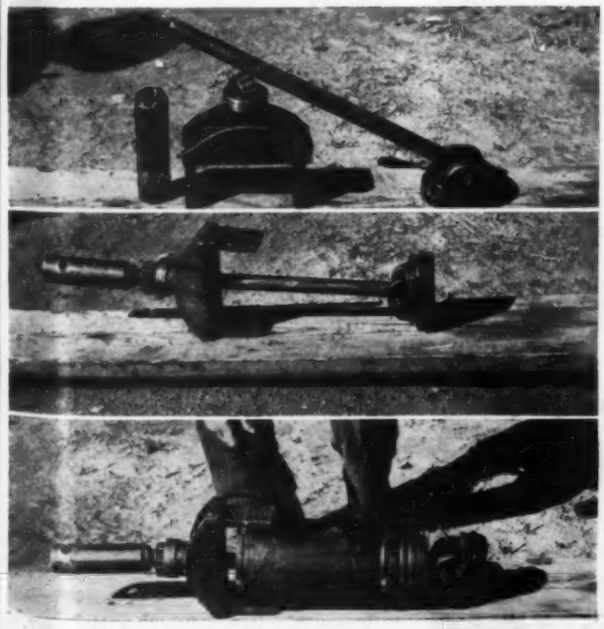
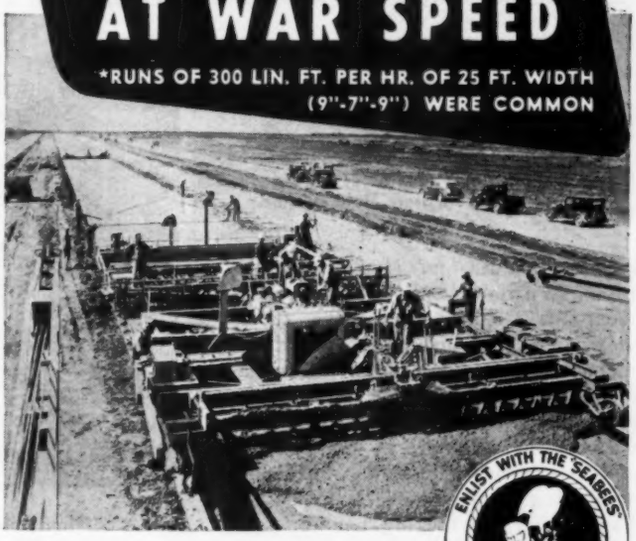


Fig. 2. Three views of puller for heavy tractors, built by Megarry Bros., Minnesota contractors.

How ONE Contractor Paved 240 MILES of Runway Slab AT WAR SPEED

*RUNS OF 300 LIN. FT. PER HR. OF 25 FT. WIDTH (9"-7"-9") WERE COMMON



ENLIST WITH THE SEABEES

USED TWO 34E DUAL DRUM PAVERS WITH *ONE* JAEGER TEAM

THE RECORD: In the first 18 months since Pearl Harbor, Koss Construction Co., Des Moines, Ia., completed 13 contracts for over 3,500,000 sq. yds. of concrete airport paving (more than 240 miles of 25 ft. slab)—all poured with 34E dual drum pavers followed by Jaeger Paving Teams (25 ft. Screw Spreader and Type "H" Finisher).

Two of these big pavers were often used with only one Jaeger Spreader-Finisher Team.

THE REPORT: Mr. Richard Koss states: "At no time has this Jaeger equipment failed to keep up with the production of two pavers and this includes all types of weather from the very hottest days to the coldest winter days that we poured concrete . . . In spite of the large amount of yardage laid, the machines are still in excellent shape."

THE VERDICT: For today's — and tomorrow's — paving needs (steady, high production with small crews) use the Mechanized Paving Team, originated by Jaeger.

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223 Dublin Ave., Columbus 16, Ohio
ALSO MIXERS—PUMPS—HOISTS—TRUCK MIXERS

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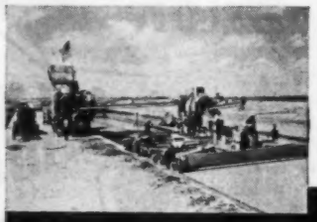
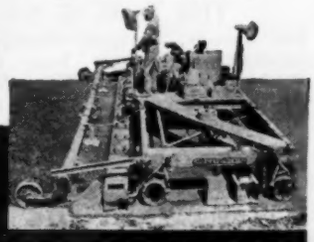




JAEGER
SCREW CONCRETE SPREADER
TYPE "H" FINISHING MACHINE

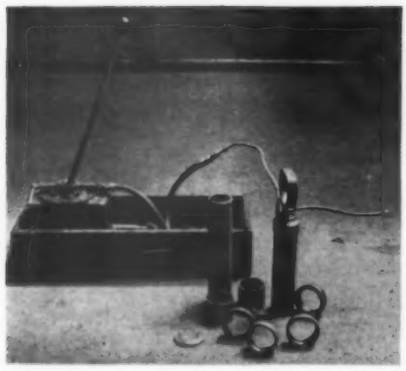


Fig. 3. This more elaborate outfit was rigged up in the Minnesota state highway shop.

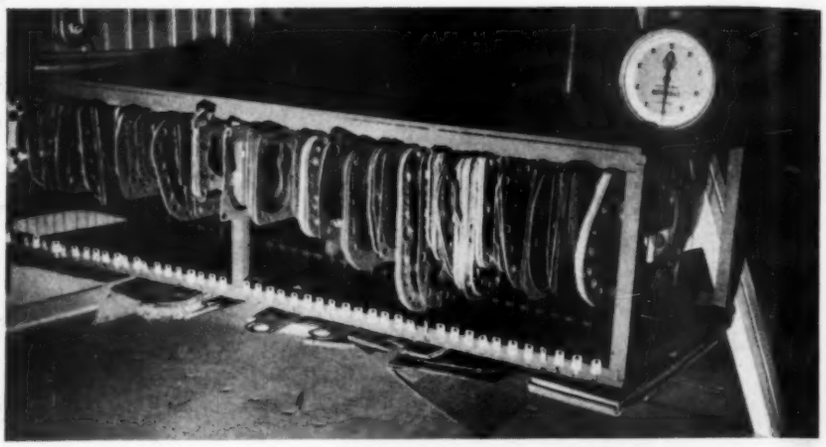
repair mechanics of Megarry Bros., road and airport contractors who hail from St. Cloud, Minn. The three views in Fig. 2 show its details which include a round bar from a broken axle, a lower shoe which tilts on a cross bolt for insertion through the cylinder in a sideways position; a roller bearing unit; and a threaded tightening sleeve which is turned by hand using a wrecking bar for leverage.

Still different is the sleeve pulling outfit fashioned for truck motors by the men in the Minnesota state highway central repair shop at St. Paul. The assembly shown in Fig. 3 also includes a plug gauge for testing high spots in cylinder walls to .00025-in. accuracy. For power, this puller utilizes a hand-operated hydraulic ram unit which once did duty as a snow plow lift (a Blackhawk pump unit). It can remove cylinders either by pushing or pulling. One end is anchored by inserting through the "eye" a stout cross bar which is anchored against the motor block. At the other end is horseshoe collar which fits around a slot as in some factory designs. The assembly pictured includes two extra-length sleeve extensions and bottom and top collars for positively holding the sleeve for either push or pull removal.

▼

Neat "Bird Cage" Helps Keep Track of Gaskets

A slot for each type of gasket, with its storehouse inventory number lettered above on a tab, is one of the many good-housekeeping kinks devised by the Gogebic County highway commission staff at Bessemer, in upper Michigan. The gaskets are stored up near the low ceiling in a simple wire-threaded wood-framed cage as shown in the accompanying photo. George W. Koronski is county engineer.



How more than 50 different kinds of gaskets are stored for quick access

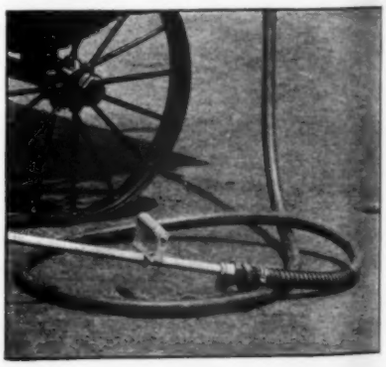
Conserving Hose

"For a long time," reminds Littleford Bros., Inc., in their publication, "we have all taken spray hose and loading hose for granted. My, my, how time has changed.

"Even the flexible metal hose situation is now so critical that we have only the 1-in. rubber spray hose to offer. High priority War Department orders have gobbled up all available metal hose, and it is truly fortunate that we can even make shipment of the rubber spray hose.

"This rubber hose is suitable for temperatures up to 200 degrees and if it is drained well after each day's operation, we know that customers will experience no difficulty in its choking up. Many users, in fact, prefer the rubber hose due to the difference in weight and much greater flexibility."

Long lengths of hose are out of the question. All customers are asked



to cooperate with the war effort by patching up their old hose or reducing their new requirements to the very minimum. Use pipe wherever possible with short lengths of the old flexible metal hose attached to the ends of the pipe for flexibility.

▼

"TESTS OF COMPOSITE TIMBER AND CONCRETE BEAMS," by Frank E. Richart and Clarence B. Williams, Jr., is the title of Bulletin Series No. 343, issued by the Univ. of Illinois Engineering Experiment Station, Urbana. Price 75 cents.

Don't Scrap it - Weld It

THE TIME IS NOW!

For speedy, wartime emergency repair welding, you can't beat MANGANAL WELDING PRODUCTS. With MANGANAL you can meet every requirement for efficient, fast, durable repair welding.

Repair your broken and worn parts with Manganal—it's the easy, quick and efficient way. Manganal alloy steel welding, wedge bars and shapes give new lives to old parts.

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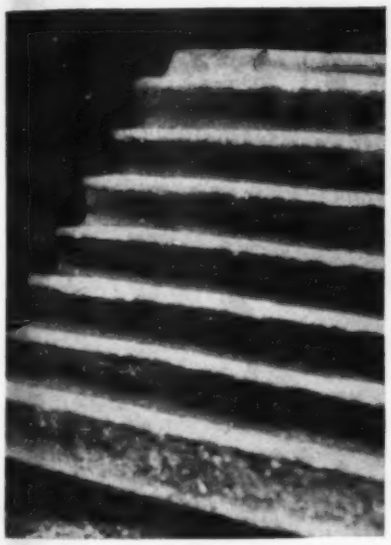
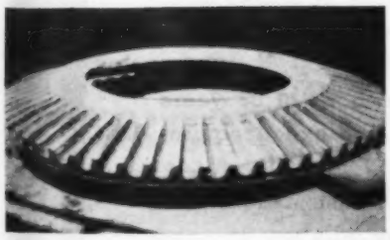
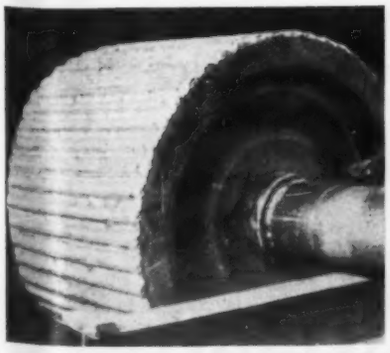
Applicator Parts for Re-Tipping and Resurfacing

Don't forget, writes Hobart Brothers Company, that applicator bars, rounds, wedges and special shapes are now available to save a great amount of time in building up many parts with electric welding. The accompanying photos show some of these shapes as adapted to crusher plates, shovel teeth, rotary crushers, driving gear teeth, etc. Many worn parts may be reclaimed more economically and quickly by the use of special manganese or nickel-manganese applicator parts than by depositing all weld metal. They achieve the same results as building up with electrodes of the same analysis, without the time and labor that would be required to build up the entire surface.







1—2—3. Typical uses of applicator bars, rounds and wedges. Photo courtesy Hobart Brothers Co., Troy, N. Y.

Piston before and after use of Metaffin.

CONTROL SLUDGE IN YOUR MOTORIZED EQUIPMENT!

Sludge in lube oil means sticky rings, clogged oil lines and inevitable maintenance costs which would never be necessary if sludge formations were prevented.

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will prevent harmful accumulations of sludge. All you do is maintain a definite concentration (a mighty small one) in your lube oil.

Metaffin is also a sure means of purging a motor of all harmful sludge deposits.

Safe, economical, dependable . . . Metaffin will cut maintenance costs due to sludge to the bone.

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Service Representatives in All Principal Cities

MAGNUS CLEANERS

The procedure in using applicator parts is to place them in the proper position and tack weld them in place. Then weld them in place with a heavy bead and build up between them to the required height, just as in building up worn parts without the applicator parts. Peen both the deposited metal and the applicator parts as you go along. When using applicator parts, it is always best to ask the supplier to give you detailed instructions as to the best electrode and procedure to use in connection with each type of job.

2. Crusher roll in process of being built up at Houghton County highway shop, Hancock, Michigan. Down hand steel applicator bars and manganese rod. Photo by Roads & Streets staff

CAUTION—Never attempt to weld on manganese steel unless it is solid. Beware of porous or honeycombed structure beneath the surface of the metal. Such weak metal should be thoroughly removed by grinding. Do not water-quench welds on manganese steel. If it is found desirable to use water to keep the work safely cool while welding, apply the water only to the work metal—NOT to the deposited metal.

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CORONACH

"Of those immortal dead who live again
In minds made better by their presence."

ALBERT RIETH, President of Reith-Riley Construction Company, Goshen, Indiana, died suddenly July 17 at Goshen hospital.

Mr. Rieth was a past president of the Indiana Highway Constructors, Inc., and was Elkhart County surveyor 1913-1916. He formed a partnership in 1917 with George Riley, now of South Bend, Ind.; in 1940 he purchased Mr. Riley's interest and became sole owner of the firm.

▼

ROGER VAN VECHTEN, grading and highway contractor, died July 16 at St. Joseph's hospital in Milwaukee. He was 50 years old. He had been in the contracting business 23 years, and had worked throughout Wisconsin on many important highway projects.

During the past year he performed a large amount of war work, including much of the grading at Truax Field at Madison and work at the Milwaukee County airport.

He was formerly president of the former Associated Wisconsin Contractors, now the Wisconsin Road Builders' Association.

▼

SAMUEL REID RUSSELL, 63, of the explosives department, E. I. du Pont de Nemours & Co., dean of America's dynamite technicians, died suddenly early Thursday morning, July 8, at a hotel in Easton, Pa. He resided at 725 Coverdale Road, Wilmington, Del.

Mr. Russell, who since he joined Du Pont in 1907 has shot more dynamite than any man in the country, had gone to Easton to supervise a blast.

The foremost authority on all kinds of quarry and marine blasting, he perfected the method of tunnel blasting in open quarries. He supervised shots not only in this country but in Canada and South America. He often was called in as a consultant to the government on various projects, the deepening of Honolulu harbor being one of many, and one of particular interest.

Mr. Russell was the country's outstanding technician on precision dynamiting. One of his most spectacular

accomplishments was the felling of a river dam which had been built upright on one bank. By accurate blasting of a retaining wall, he dropped the pre-constructed dam in a prepared base with only inches to spare on either side of the dam.

He helped develop new methods for harbor blasting, particularly for cleaning out big harbors such as that of New York City. He was consultant to many of the country's largest engineering and contracting firms on their biggest projects. As the leading dynamite expert, he addressed engineering societies, clubs and other organizations all over America. He also wrote numerous articles for trade publications on the techniques of dynamite blasting.

Mr. Russell was born in Belfast, Ireland, on Dec. 27, 1880, the son of Samuel and Sarah Russell. He came to this country at an early age, and was educated at Troy, N. Y., high school and Rensselaer Polytechnic Institute. He received a degree in civil engineering in 1904. He was a member of Delta Tau Delta fraternity.

He worked as a construction engineer for several companies before he joined Du Pont in 1907 as a salesman in the Nashville, Tenn., office. He soon was transferred to the technical division, and became one of the country's first specialists in dynamiting techniques. He was senior technician at the time of his death.

▼

ARTHUR C. EVERHAM, 66, director of Public Works, Kansas City, Mo., died July 22. Mr. Everham was appointed to his Kansas City post in May, 1940. He had been assistant tunnel engineer for the New York Central Railroad in the construction of the railroad's tunnel under the Detroit River, in Detroit. He went to Kansas City in 1911 as assistant chief engineer for the Kansas City Terminal Company, in construction of the Union Railroad Station. During the first World War he was assistant in charge of building 78 large munition plants for the government.

▼

GEORGE P. HEMSTREET, engineer for the Hastings Paving Company, and formerly vice president of the company, died July 22 at the Dobbs Ferry (N. Y.) hospital. Age 68. He attended Cornell University.

▼

FRED M. GAHAGAN, president of the Gahagan Construction Company, 147 Remsen Street, Brooklyn, died July 7 in the Lenox Hill Hospital. He was 45 years old. His illness developed some months ago after his return from Panama, where, for the large part of the last two years, he had been overseeing projects for his company.

After attending the Riverdale Country School, Riverdale-on-Hudson, 1912-16, Mr. Gahagan entered Williams College. He left toward the close of his senior year and later studied engineering at Columbia, where he was graduated in 1923. He then joined the construction firm headed by his father, the late Walter H. Gahagan, as assistant engineer.

Since his election to the presidency of the Gahagan Construction Corporation and its affiliates, in 1933, Mr. Gahagan had supervised the direction of contract operations with Federal State and municipal governments, railroads and private interests exceeding $30,000,000 in cost. The list of undertakings included the Ward's Island sewerage disposal plant.

Mr. Gahagan was first vice president of the General Contractors Association, on the executive committee of the Dredge Owners Protective Organization, a director of the National Association of River and Harbor Contractors and the Brooklyn Club.

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HERCULES "IRONROLLERS"
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New Equipment and Materials

Circular Cutting Tool Speeds Ring-Connector Wood Construction

The rapid increase in timber construction of industrial buildings, aircraft hangers, mess halls, barracks and other structors essential to the war effort has been greatly accelerated by the use of bolted ring-connector joints. This type of joint increases the load carrying capacity of timber structures, prevents bending and shearing of the bolts which often results from wind-sway, vibration and "settling" of the structure.

An improved tool is being produced by a Milwaukee concern for cutting the circular grooves for the rings or bearing plates. In preparing the timber for ring-connector joints, circular grooves are cut concentric with the bolt holes in the rabbetted overlapping ends of the timbers to be jointed.

The split rings, of pressed steel, range from 2½ to 6" in diameter, and are available through local sources of supply in most industrial centers. The circular groove cutter is made with either two or four renewable blades for split rings from 2½" to 6" in diameter. The cutter may be driven by a portable electric drill or drill press, or may be used in a hand-operated brace and bit. A different type of cutting head, with inside blades, is furnished to countersink bearing plates of the same diameter as the connector rings. These cutting tools are manufactured by the Circo Tool Co., 264 E. Ogden Ave., Milwaukee 2, Wis.

▼

Thread-Tool Grinding Fixture

A new and unique thread-tool grinding fixture for grinding both 60° and 29° threading tool bit with extreme precision is announced by Robert H. Clark Company of Los Angeles, manufacturers of Clark Cutting Tools.

The manufacturer states that the new fixture has no graduated scales or moving parts. The machinist merely slides the bit into the holder, tightens a setscrew and places the fixture on the grinder work table, properly positioned for the thread angle desired as indicated on the fixture. This automatically holds the bit securely and precisely at the desired angle to the grinding wheel.

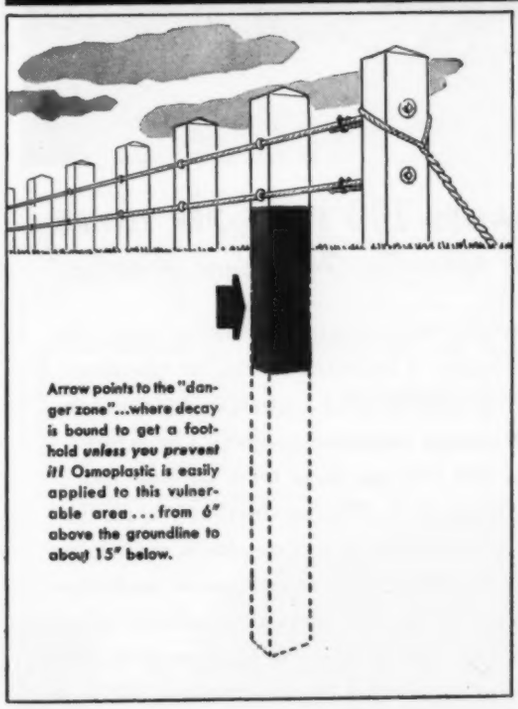
Experienced machinists and tool grinders will find this fixture saves time and eliminates waste caused by grinding inaccuracies, according to the manufacturer, and even inexperienced shop help can do a quick, accurate and finished job of thread tool bit grinding when using it.

The design of the fixtures makes it especially adaptable for use with a magnetic chuck, although if desired it can be easily clamped to the work table. The special tool bit holders will securely hold round or square tool bits of all sizes from ⅛" to ⅝" for cutting both right and left hand threads.

Correct side clearance is provided for, and all bits may be ground with or without rake on the cutting face. The fixture may be used on any surface grinder or cutter grinder and is made of high permeability steel for maximum holding value and long life.

The new fixture is available in two standard sizes, each of which takes all tool bits within an ⅛" to ⅝" range.

GUARD
AGAINST
Guard Post Decay
APPLY
OSMOPLASTIC



When rotted highway guard posts snap off at the ground line, not only money *but manpower* is the high price paid for neglect. The solution is: Stop decay *where it starts...before it starts* ... with OSMOPLASTIC!

Many highway engineers have found this economical method of applying OSMOPLASTIC is highly effective on *all* timber installations... not only guard posts but bridges, culverts, guide and fence posts. Wherever timber touches timber... or humid earth ...or is set in water... OSMOPLASTIC adds valuable *extra years* of service.

It costs little to apply this topnotch wood-preservative, and it is so simple to daub it on. Mail the coupon below for full details as to how you can save your timbers *today* from decay *tomorrow*... with OSMOPLASTIC!

(P. S.: OSMOPLASTIC has a surface coverage of approximately 75 sq. ft. per gallon!)

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Please send me full information on Osmoplastic applications.

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With the Manufacturers

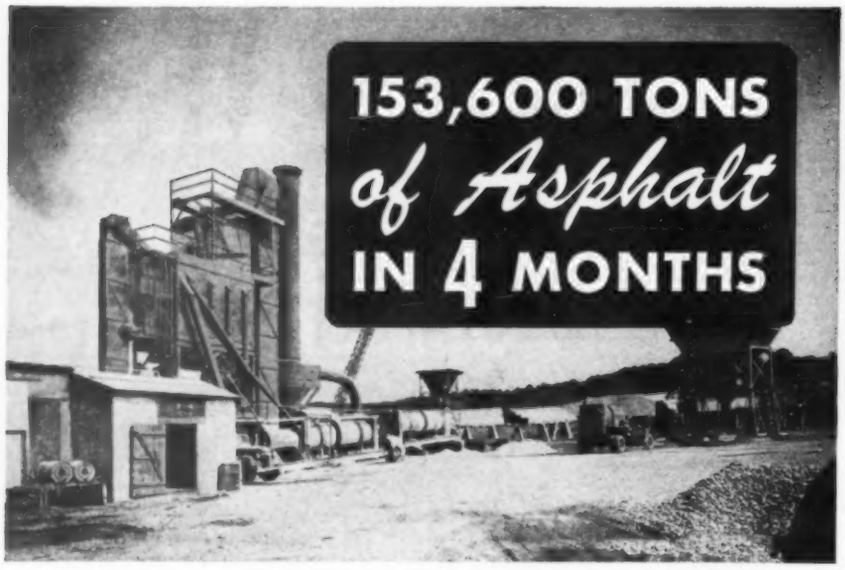
Appointed Distributors

The Coulter-Sibbett Steel Co. has been appointed Arizona and Southern California distributors of Timken Graphitic Steels, according to a recent announcement of the Steel and Tube Division; The Timken Roller Bearing Company, Canton, Ohio.

Appointment of The Coulter-Sibbett Steel Co. follows dissolution of Coulter-Sibbett & Burke, former distributors.

From their Oakland Office, Coulter-Sibbett has been distributing Timken Graphitic Steel in Northern California since 1941.

The Los Angeles office and warehouse are located at 1801 East Slauson, Los Angeles 11, California, where orders for Graphitic Steel rings, discs, and other forgings can be handled, in addition to regular Graphitic Steel stock.



H & B PLANT AVERAGES 100 TONS PER HOUR
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(FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

● With this Hetherington & Berner plant, the Hunkin-Conkey Construction Co., of Cleveland, produced 153,600 tons of asphalt in four months on the Ravenna ordnance project. The schedule called for 100 tons per hour for a 20 hour day—bad weather and all. This production is typical of the way in which H & B mixing plants are helping speed the building and maintenance of roads that lead to Victory. H & B plants are available today, of course, only for essential military projects. The H & B factory itself is engaged almost 100% on war work, but H & B owners are assured of dependable service on parts and repairs.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS • INDIANA

Hetherington & Berner

H. K. Porter Co. Purchases Quimby Pump Co.

Purchase of Quimby Pump Co., with plants at Newark and New Brunswick, N. J., by H. K. Porter Co., Inc., Pittsburgh, Pa., has been announced by T. M. Evans, president of the Pittsburgh firm.

T. M. Evans

Established before the turn of the century, Quimby Pump Co. manufactures a full line of pumps, including screw, centrifugal and rotex types used in industry. At present the company is also building considerable quantities of pumps for both the Navy and Maritime Commission. The Quimby plants will be operated as a division of H. K. Porter Co., Inc., a manufacturer of industrial locomotives and chemical processing equipment. The purchase was made in order to further diversify H. K. Porter Co., Inc.,'s line of products.

Clukies Joins Robins

Francis O. Clukies has joined the sales staff of Robins Conveyors, Inc., Passaic, N. J., engineers, manufacturers and erectors of materials handling machinery.

Mr. Clukies will specialize in products of the Mead-Morrison Division. He was with the Mead-Morrison Mfg. Co. for some 30 years before Robins bought out the materials handling end of that company. In the interim, he was in business for himself. He will work out of the New York office of Robins.

Horine of Mack Appointed to WPB

M. C. Horine, sales promotion manager of Mack Trucks, Inc., has been appointed special consultant to the director, Automotive Division, War Production Board, it was announced recently.

Mr. Horine has been granted leave of absence from Mack and will make his headquarters in Washington. Regarded as one of the best informed men on motor transport in the automotive industry he has long been

active in the affairs of the Society of Automotive Engineers and has served on many of its committees. He is a past chairman of the Metropolitan section, S.A.E.

▼

J. G. Walker Appointed Mgr. New York Sales District for Transite Pipe

James G. Walker, prominent in the civil and structural engineering field, has been appointed manager of the transite asbestos pipe department for the New York sales district of Johns - Manville. Mr. Walker assumed his new duties on June 16. A native of Lowell, Mass., his technical training includes two years at Holy Cross University and four years at the Massachusetts Institute of Technology, where he specialized in architectural engineering. After graduation from Technology, he served as engineer for several large construction companies, and for the Portland Cement Association.

J. G. Walker

In 1928 he was employed by the Alpha Portland Cement Company, where he served in an engineering sales capacity until joining Johns-Manville. Among the many organizations with which Mr. Walker is affiliated are the Engineers Club of New York, the Technology Club of New York, the American Society of Military Engineers, and the "Moles." Mr. Walker is 41 years old, married, has two children, and now lives in Scarsdale, N. Y.

▼

Caterpillar Establishes Safety Record

Caterpillar Tractor Co.'s more than 17,000 employes established a company all-time safety record during the first six months of 1943 when they established a frequency rate of only 4.36 lost-time accident cases per million man hours of work, it is announced by H. S. Simpson, Safety Engineer.

Two other all-time marks were set up during the month of June when but seven lost-time cases and a frequency rate of 2.08 were recorded.

▼

Jorgensen Expands Activities

The Earle M. Jorgensen Co., distributors of Timken Graphitic Steel in Texas and Oklahoma have expanded their activities to include the sale of Graphitic Steel in Arizona and Southern California.

A complete stock of Timken Graphitic Steel bars will be maintained in the Los Angeles warehouse at 10510 South Alameda Street.

* * *

Claude M. Livermore, long identified with West Coast tool steel distribution, has recently become associated with the Earle M. Jorgenson Co.

Marcello King Joins Worthington

Worthington Pump and Machinery Corp., recently announced that Marcello A. King has joined the organization as Executive Engineer of its Moore Steam Turbine Division, Wellsville, N. Y., in charge of design, research, testing, and service. Engaged in turbine engineering and manufacture since his graduation from the University of Michigan in 1916, he was with the Kerr Turbine Co. and later with the Elliott Co. where he

GIVING VICTORY A LIFT

ON highways leading to the far-flung battlefields of the world, Cargo Bodies built by the Hercules Steel Products Company are carrying vital materials of war in unbroken lines to our fighting men and their allies.

Hercules Dump Cargo Bodies, too, are giving dependable service in many camps and on many fronts, both at home and abroad.

With so large a proportion of our capacity occupied by war production, it's only natural that our distributors' stocks of Hercules Dump Bodies should be low. However, when you need new equipment for any essential project or a war contract, the Hercules distributor can take care of you, and the same Hercules representative will keep your present Hercules Hydraulic Hoists and Bodies operating at greatest efficiency, if you'll call on him when you need service.

REMEMBER THESE FEATURES OF

SPEEDRAULIC HERCULES HOISTS

- Exclusive Center-Lift Action
- Double Bridge-type Lift Arms
- Balanced Piston Valve, with Finger Tip Control
- 6", 7", 8" and 10" Hoists

HERCULES STEEL PRODUCTS COMPANY
GALION, OHIO

ALL TRAILERS ARE NOT ALIKE!

Ask the salesman these questions!

- Are the beams strong enough to carry the rated load without sagging after several months' service?
- Does the frame have enough cross members?
- Are the bearings, axles, and wheels of ample size and weight to carry the occasional overload and stand up under road shock?
- Are the radius rods, brake cross shafts and other points requiring lubrication bronze bushed?

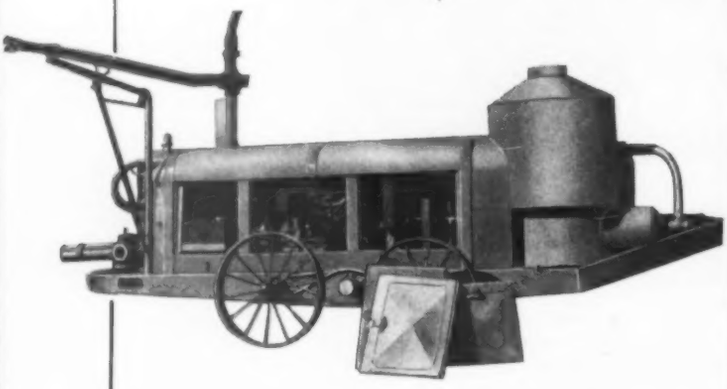
JAHN Heavy Duty TRAILERS in Capacities from 5 to 100 TONS

These are just a few of the things to check before planning on your post-war trailer. But before you buy any trailer, check into the exclusive design of Jahn Trailers.

C. R. JAHN COMPANY
1345 W. 37th Pl., Chicago 9

"Come to Trailer Headquarters"

HOT ASPHALT WHEN YOU NEED IT



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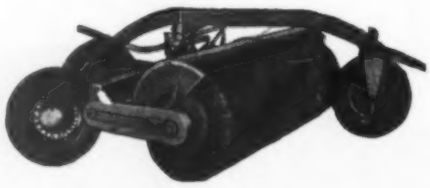
GRACE RAPID FIRE

circulating heater for Tank Cars. Built-in steam equipment for thawing cars too cold to circulate.



Grace Two-way Sweepers help "Keep 'em Flying" by cleaning and maintaining airfield runways. The limitation orders restrict delivery of new machines. We offer prompt parts shipment to enable you to keep your present Grace Sweeper in A1 shape.

W. E. GRACE MFG. CO.
DALLAS, TEXAS

Concrete
VIBRATORS and GRINDERS
Write for Circular on types, sizes and Prices

ELKHART **White Mfg. Co.** INDIANA

SILVER KING HIGHWAY MOWER

● Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit ENGINEERED for the job. If you want replacement parts now to insure tip-top "good-as-new" performance *tomorrow*, write. We will be glad to serve you.

MANUFACTURED BY
THE FATE-ROOT-HEATH CO.
PLYMOUTH, OHIO

"RESTRICTED TRAVEL!"

Restricted travel hinders a visit, but we trust we have done a good job in filling your needs for time-proved ribbon and other contraction joints, as well as "FLEX-PLANE" finishing machines.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO, U. S. A.

held the position of Manager of Engineering.

▼

Appointed Member Advisory Committee

Sidney L. Myers, Export and Federal Sales Manager, LaPlant-Choate Manufacturing Co. of Cedar Rapids, Iowa, manufacturers of dirt moving and road building equipment, has been appointed a member of the Allied Tractor Equipment Industry Advisory Committe of the War Production Board.

S. L. Myers

The advisory committee was formed for the purpose of supplying information and making recommendations to the War Production Board. It is composed of representatives of companies in the tractor equipment industry and allied branches carefully selected to produce a balanced cross sectional representation of the industry. Meetings are held regularly in Washington, D. C.

Mr. Myers has been identified with LaPlant-Choate for 20 years. He has been export sales manager since 1930, and is largely responsible for the wide distribution of that company's scrapers, bulldozers, and trailbuilders in the foreign markets.

▼

Athey Names Nadherny

R. J. Nadherny has been made Production Manager of Athey Truss Wheel Co., Chicago, Ill., according to an announcement by C. K. Davis, Athey president.

E. J. Nadherny

"For some time it has been recognized that increased volume and changing conditions were imposing overloads on our organization which could not be entirely satisfied by individual transfers and redistribution of functions among existing personnel," says Mr. Davis in his announcement to dealers. "In meeting this situation, R. J. Nadherny has been added to our organization as Production Manager. This segregation of manufacturing from engineering and development amplifies our capacity in both divisions."

Mr. Nadherny has had 20 years of experience with equipment similar to the products manufactured by Athey, which qualifies him for his new position. Seven years of this time were spent in sales engineering capacities with the Mercury Manufacturing Co. of Chicago.

▼

A "MANUAL FOR CONCRETE AND MORTAR COMPUTATIONS" has just been published by North American Cement Corporation. Available free on request to the firm's address, 41 E. 42nd St., New York, N. Y., this handy reference is just what a lot of contractors, engineers, estimators, inspectors and others often need to help them design mixtures and figure quantities. It gives concrete proportioning data on a volumetric as well as a weight basis, while recognizing that exact mixture control usually requires weighing and accounting for specific quantities and free moisture contents.

They're All in This Complete Unit

A Model 105 SCHRAMM Compressor with special racks and tool boxes with fixed locations for each tool and accessory, so that most any compressor requirement that arises can be met and handled. Equipment includes: Double hose reels, live air type, each equipped with three 50 ft. lengths of ¾" air hose. Air receiver with three extra outlets, equipped with quick action valves, hose couplings and 3½" vise for flat or pipe work, on swivel base. Tools recommended depend entirely on users' requirements and the ability of tool manufacturer to furnish them under existing conditions.

Write Today for Catalog 42PA

SCHRAMM, INC.

THE COMPRESSOR PEOPLE

WEST CHESTER, PENNA.

Clearing House

FOR SALE

1¼ yd. Bucyrus 41B Shovel Attachment.
27-E Ransome Dual Drum Paver.
2 Ton C.H. & E. Tandem Roller.
3—15,000 gal. Steel Storage Tanks.
2 Ton Asphalt Plant.
750 and 1,000 gal. Etnyre Distributors.
3—Vulcan Nos. 1 and 2 Hammers.
1 yd. Koehring Gas Cat. Crane.
110 Ton Blaw-Knox Batch Bin.
½ yd. Blaw Knox Clam Shell.
20 Ton Ohio Locomotive Crane.
1 yd. B-2 Steam Shovels.
15 Ton 100 ft. Boom Clyde Steel Derrick with 100 H.P. Elec. Hoist.
15 Ton Plymouth Gas Locomotive.
2—3W & 5W Monighan Draglines.
9B3 & 7 McKiernan Terry Hammers.

TIDEWATER EQUIPMENT & MACHINERY CORP.
305 Madison Ave., New York City, N. Y.

EXCEPTIONAL BARGAINS

IMMEDIATE SHIPMENT

FOR SALE:

44C Barber-Greene Ditcher.
10S Koehring Mixer on 2 Pneumatic Tires.
4" Rex Self Priming Pump—Gasoline Power.

FOR RENT:

522 Barber-Greene Pneumatic Tired Bucket Loader—Gasoline Power.

PAUL L. MATCHETTE COMPANY
Exclusive Distributors for Barber-Greene Co.
Missouri — Kansas — Oklahoma
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TRENCHING MACHINES

P & H Model 10-30
Digs 36" wide and 13' deep.
Excellent Condition.
Also, Like New 21 Parsons.

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In all sizes of tractor, truck, wheelbarrow, passenger, or 1800x24 tires.
An EQUA-FLEX "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!
We have pre-war quality used passenger, truck and some farm tractor tires.

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FOR SALE

One-Ton Iroquois Asphalt Mixer.

Box 2050, ROADS AND STREETS
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FOR SALE

Pumps, All Sizes.
Power Units.
Light Plants.
150 HP Fairbanks Morse Engine.
Buckets, All Types.
27-E Pavers.
2 Bag Mixers.
Boilers.
2—12 Yard Euclid Caterpillar Wagons.
3—8 Yard Allis-Chalmers Caterpillar Wagons.
Conway Mucker.
Tunnel Loader.
Concrete Placer.
1—¼ Yard Thew Caterpillar, Steam.
50-B Bucyrus Combination.
Booms.
Derricks.
¾ Yard Northwest Crane, Model 105.
Tanks, 8,000 and 10,000 Gal.
15 Inch Dredge Pipe Fittings.
Road Forms.
Gasoline Pumps and Power Units.
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FOR SALE

McLanahan 18x24 Rolls Crusher complete with 20-yd. bin, elecator, conveyor, belts, etc., with 18x24 secondary crusher; powered with practically new D-13000 "Caterpillar" Diesel unit. This outfit all in good condition and ready to work.

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FOR SALE

1—1¼ yard Lima combination shovel dragline and crane, completely rebuilt.
2—Gardner-Denver 420 cu. ft. air compressors powered with caterpillar diesel engines mounted on trucks.
4—Gardner-Denver wagon drills.
1—Caterpillar Model 48 elevating grader powered with diesel engine.
1—Ingersoll-Rand jack bit grinder.

ANDERSON EQUIPMENT COMPANY
Merchants Nat. Bk. Bldg., Omaha 2, Nebr.

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New or Rebuilt
Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also *buy* your old instruments or take them in *trade*.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS 88.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
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Equipment Wanted

20 to 25 Ton Locomotive Crane.
1—600 Ft. Cap. Air Compressor.
1—Barber-Greene Bucket Loader.
1—24 x 36 Jaw Crusher.
1—Switching Locomotive.

RUSSELL STANHOPE
Darien, — Connecticut

FOR SALE

Construction and Contractor's Equipment All in first-class condition!!!

2, RD 8 Caterpillar Diesel Tractors, double drum, heavy duty power units with YR 12 LeTourneau Scrapers.
1, RD 8 Caterpillar Diesel Tractor, double drum, heavy duty power unit with C34 LaPlant Choate Scraper.
1, 75 Caterpillar Diesel Tractor, double drum, heavy duty power unit with J-8 LeTourneau Scraper.
1, RD 7 Caterpillar Diesel Tractor, double drum, heavy duty power unit with G-6 LeTourneau Scraper.
1, RD 7 Caterpillar Diesel Tractor with push plate.
8, Allis Chalmers Speedace Tractor Wagons. 7½-yd. capacity.

IRON & STEEL PRODUCTS, INC.
13478 S. Brainard Ave., Chicago, Illinois
38 Year's Experience
"Anything containing IRON or STEEL"

FOR SALE OR RENT

2—2 Ton C.H.&E. Tandem Gas Rollers.
1000 Gal. Cap. Distributor Truck.
4—15,000 Gal. Steel Storage Tanks.
12x20 Farrel Jaw Crusher.
3 KW and 5 KW Light Plants.
2 Ton Asphalt Plant.

L. M. STANHOPE
305 Conestoga Road — Wayne, Penna.

BUY WAR BONDS

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity-

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LA CROSSE, WISCONSIN U. S. A.

SAVE 50% ON FUEL AND WAITING TIME

HEAT AND MELT TAR, PITCH, ASPHALT

TWICE AS FAST

AEROIL "HEET-MASTER"

Complete outfits on skids or on steel tires, capacities 90, 110 and 165 gallons. All sizes can be obtained with hand spray attachment. Send for FREE BULLETIN No. 194RS. For full information of concrete curbing machines, tool and surface heaters, asphalt tools and accessories, etc. Write for FREE Catalog No. 240RS.

NEW cleaning and degreasing tanks and sprayers to keep equipment in condition (Bulletin 250RS).

AEROIL BURNER CO., INC.
111 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

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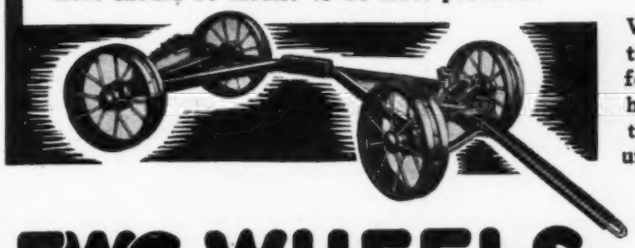
TAKE THE MACHINE TO THE JOB!

Let Us Plan EWC WHEELS and MOUNTINGS For Your Stationary Equipment!

Almost any type of machinery can be made more efficient if it is made portable—with the help of EWC Wheels, Axles, Springs, Tongues, etc. In these fast-moving days, when minutes count, equipment should be mobile to be most practical.



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Dept. RS, Quincy, Ill.

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers, Elevators, Sweepers, Screens, Wash Boxes, Bins, Pulverizers, Feeders, Spreaders, Kettles, Conveyors, Drag-Lines "GAYCO", Centrifugal Air Separators

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd. 340 Canada Cement Co., Montreal, Que., Can.

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ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan Illustrated CATALOG today.

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DOWNTOWN ON YOUR DOORSTEP

RATES FROM $3.00

DIG and HAUL
. . at low cost

WHEREVER materials are to be moved a distance of 100 ft. or more, a Sauerman Scraper or Cableway cuts costs, because it is able to reach the entire distance and dig, haul and place the materials without the help of other labor or equipment. There is a definite saving, both in capital cost and operating expense, when a Sauerman machine is used for long range work.

Tell us about your digging and stockpiling problems. We will offer advice and send catalog.

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588 S. CLINTON ST., CHICAGO 7, ILL.

The Pioneer Does It Again

—Full Hydraulic Control—

The Root Model No. 55 Truck Patrol is a machine of many uses. Grading — Ditching — Shoulder Work — Cutting Sod — and Shaving Snow and Ice are but a few of its many valuable uses.

Working Today for Victory—
Tomorrow for You.

ROOT SPRING SCRAPER CO.
KALAMAZOO, MICHIGAN
Since 1891

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THE U.S.S. OKLAHOMA IS RIGHT SIDE UP

★ ★ ★ ★

AMERICAN CABLE TRU-LAY PREFORMED WIRE ROPE DID THE PULLING

Official U.S. Navy photograph

Pearl Harbor, Hawaii. Even Date—The 29,000 ton U.S.S. "Oklahoma" is again afloat. During months of preparation by the Pacific Bridge Company, some 50 miles of TRU-LAY Preformed and CRESCENT Non-Preformed wire rope (ranging in diameter from 1" to 3") was shackled to the huge ship, then in less than 69 hours operating time the "battlewagon" was pulled out of her list of 151 degrees back to within 10½ degrees of natural position.

For this spectacular job, a sling or bridle was put over the ship. This bridle was made of 42 lengths (averaging 360') of 3" CRESCENT Non-Preformed rope. Attached to this were 21 reels (10,000' each) of 1" TRU-LAY Preformed wire rope. These were attached to winches ashore, and after less than three days steady pulling, the "Oklahoma" was right side up.

The American Cable Division, not only for this shining example but for its less spectacular day-in and day-out effort, is proud to be numbered among those who are working to speed the war's victorious end.

AMERICAN CABLE DIVISION Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

PROTECTED from flying particles of grit and metal by his "diver's" helmet, this aircraft worker is sand-blasting the fuselage frame of a PT-17 Primary Trainer. Furnishing air at over 100 lbs. pressure to do this work, as well as supplying a light wash of fresh air within the helmet, are important uses of air compressors.

To keep air compressors at maximum efficiency, not only for this vital war work, but for all types of industrial service throughout America, operators everywhere are lubricating them with Texaco.

Texaco Alcaid, Algol or Ursa Oils keep compressors free from hard carbon deposits. Valves open wide and shut pressure-tight; rings stay free, ports and air lines clear.

So effective have Texaco lubricants proved in increasing output that they are definitely preferred in many important fields, a few of which are listed in the panel.

A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

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★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT – CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY